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INSTITUTIONAL BARRIERS AND RECOMMENDED ACTIONS

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Final Technical Report
Research Project T9233, Task 38
Western States Transparent Borders Project

WESTERN STATES TRANSPARENT BORDERS PROJECT

INSTITUTIONAL BARRIERS AND RECOMMENDED ACTIONS

MONTANA

by

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16. ABSTRACT

This is the second report for an FHWA sponsored project that is investigating the barriers to implementing IVHS commercial vehicle operations (CVO) technologies in seven northwestern states. This report describes the barriers to implementing the IVHS CVO technologies and the steps needed to surmount those barriers. The report is intended to serve as a blueprint for state agency efforts to use to successfully and incrementally improve the efficiency with which they regulate trucking industry operations.

The project team concludes that the primary barriers to implementation of IVHS CVO technologies are neither institutional nor regulatory. Instead, the barriers are a combination of economic uncertainty and a lack of shared vision among the various states, state agencies, and trucking industry groups. Although institutional and regulatory barriers exist in the seven participating states, these barriers are relatively unimportant in comparison to the barriers that arise from disagreements over the system's intended functions, the cost of providing the system, and the parties responsible for paying those costs.

The project team has reached the conclusion that the only way to surmount the barriers produced by the above conditions is to create a modular system that will allow both states and private companies to enter into the IVHS CVO process for little cost. The system will have to be expandable to allow its capabilities to grow as the benefits from IVHS CVO technologies become more apparent and as funding becomes available. The initial system must be simple, low cost (for both states and trucking firms), relatively easy to implement, and flexible enough to meet the needs of different states and state agencies. Finally, benefits commensurate with the costs of participating in the system must be available to all involved agencies and trucking firms.

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TABLE OF CONTENTS

Section	Page
Conclusions and Recommendations	**1**
Conclusions	1
Recommendations	3
Chapter 1. Introduction	**5**
Report Objectives	5
Other Project Reports	6
Report Organization	6
Chapter 2. Characterization of the Problem	**7**
Congestion at POEs and Other Fixed Weigh Stations	7
Delay to Trucks at Fixed Weigh Sites	9
Volume of Paperwork	9
Administrative Complexity	10
Complexity of Driver Responsibilities	10
Enforcement Constraints	11
Staff/Equipment Productivity	12
Competitive Advantages	13
Changes in the Cost of Doing Business	13
Consumer Orientation	14
Effectiveness of Safety Programs	14
Chapter 3. Implementation Barriers	**16**
Introduction To Barriers	16
Strategic Barriers	17
Communications	17
Vertical Communications	18
Horizontal Communications	20
Lack of a Compelling Argument	21
Standards	22
Leadership	23
Strategic Barriers Summary	24
Tactical Barriers	25
Within States	25
High Cost of Implementing Transparent Borders Systems	26
Imbalance of Resources	28
Bureaucratic Inertia	28
Differing Perspectives and Priorities Among Agencies/Groups	29
Turf	30
Regulatory and Legislative Limitations	31
Resistance to Change Within Organizations	31
Lack of Technical Capability	32
Physical and/or Geographic Constraints	33
Lack of Automation Within Organizations	34
Duplication of Regulatory Responsibilities	35

Section	Page
Among States	36
Variation in Regulatory Requirements	36
Incompatible Equipment	37
Variation in Policies and Practices	38
Lack of Standards	39
Chapter 4. Alternative Transparent Border Scenarios	**40**
Recommended Transparent Borders Technologies	41
Automated One-stop Permit Shopping	41
Basic Concept	41
Expanded Concept	44
Future Enhancements	45
Electronic Credentials Verification	45
Regional/National Repository For Annual Interstate Credentials	46
Replacement of Annual On-Board Credentials With Electronic Tags	47
Creation of Verification Systems	50
Summary of First Phase Implementation	54
Development of Conventional Weigh Station Sorting Systems	54
Creation of Mainline Sorting System	55
Temporary Credentials Enhancement	57
Addition of Other Motor Carrier Or State Agency Functions	59
Addition of New Safety, CDL, or Electronic Log Book Verification	61
Chapter 5. Barriers to System Implementation	**63**
Automated Permit System	63
Agency Responsibility or Procedure	66
Budget Management	68
Personnel Training or Acquisition	69
Data Collection or Transfer Procedures	69
Equipment Acquisition or Enhancement	69
Technology Development	70
Legislation, Rule or Agreement	70
Central Repository for Annual Interstate Credentials	71
Agency Responsibility or Procedure	71
Budget Management	72
Personnel Training or Acquisition	72
Data Collection or Transfer Procedures	72
Equipment Acquisition or Enhancement	74
Technology Development	74
Legislation, Rule or Agreement	74
Replacement of Annual Credentials With Electronic Tags	75
Agency Responsibility or Procedure	75
Budget Management	77
Personnel Training or Acquisition	78
Data Collection or Transfer Procedures	78
Equipment Acquisition or Enhancement	78
Technology Development	79
Legislation, Rule or Agreement	79

Section	Page
Conventional Weigh Station Sorting Systems	79
Agency Responsibility or Procedure	80
Budget Management	80
Personnel Training or Acquisition	81
Equipment Acquisition or Enhancement	81
Technology Development	81
Legislation, Rule or Agreement	82
Mainline Sorting Systems	82
Temporary Credentials Enhancement	83
Addition of Other State Agency Functions	83
Agency Responsibility or Procedure	84
Budget Management	84
Personnel Training or Acquisition	84
Equipment Acquisition or Enhancement	85
Technology Development	85
Legislation, Rule or Agreement	85
Addition of Safety-Related Information	85
Agency Responsibility or Procedure	86
Budget Management	86
Personnel Training or Acquisition	87
Data Collection or Transfer Procedures	87
Equipment Acquisition or Enhancement	88
Technology Development	88
Legislation, Rule or Agreement	88
Chapter 6. Recommended and Desired actions	**90**
Automated, One-stop Permit Shopping	90
Select Course Of Action	90
Arrange Funding	91
Hire Contractor	91
Complete System Design and Hardware Requirements	91
Sign Interagency Agreements	92
System Development	92
Staff Training and Software Distribution	93
Electronic Credential Verification	93
Select Course Of Action	93
Creation of a Central Data Repository	93
Creation of a Working Group	93
Select The Basic System Architecture	95
Arrange Funding	95
Computer System Construction	96
Complete Interagency Agreements	96
Test and Refine the Data Transfer System	97
System Start-Up Tasks	97

Section	Page
Electronic Tags	98
Create Environment For Tag Implementation	98
Determine Electronic Tag to be Used	99
Arrange Funding	99
Purchase Tags and Readers	100
Tag Distribution System	100
Verification Systems Creation	100
System Design	101
Arrange Funding	101
System Implementation	101
Conventional Weigh Station Sorting Systems	102
Select Course Of Action	102
Arrange Funding	102
Implement System	103
Mainline Sorting System	103
Select Course Of Action	103
Statute Revisions	104
System Design	104
Arrange Funding	104
Implement System	105
Temporary Credentials Enhancement	105
Select Course Of Action	105
System Design and Revision	106
Arrange Funding	107
System Start-Up Tasks	107
The Addition of Other Motor Carrier Or State Agency Functions	108
Select Course Of Action	108
Revise Interagency Agreements	108
Design System Revisions	108
Arrange Funding	109
System Start-Up Tasks	109
Addition of New Safety, CDL, or Electronic Log book Verification	110
Select Course Of Action	110
Set Standards	110
System Development	111
Design System Revisions	111
Arrange Funding	111
System Implementation	112

LIST OF FIGURES

Figure		Page
1.	Transparent Border System Implementation Paths	42
2.	Electronic Credentials Verification Data Records	52

LIST OF TABLES

Table		Page
1.	Significant Implementation Barriers in Montana	64
2.	Transparent Border System Recommendations and Montana's Responsibilities	113

WESTERN STATES TRANSPARENT BORDERS PROJECT
INSTITUTIONAL BARRIERS AND RECOMMENDED ACTIONS

CONCLUSIONS AND RECOMMENDATIONS

This report provides a review of the IVHS CVO technologies that appear to be appropriate for application in Montana. It describes the barriers to implementing the IVHS CVO technologies and the steps needed to surmount those barriers. The report is intended to serve as a blueprint for state agency efforts to successfully and incrementally improve the efficiency with which trucking industry operations are regulated.

This initial section describes the primary conclusions of the project to date and recommends a specific set of actions to be taken by Montana in the near future.

CONCLUSIONS

The project team concludes that the primary barriers to implementation of IVHS CVO technologies are not institutional or regulatory. Instead, the barriers are a combination of economic uncertainty and a lack of shared vision among the various states, state agencies, and trucking industry groups. Although institutional and regulatory barriers exist in Montana, as in the other six participating states, these barriers are relatively unimportant in comparison to the barriers that arise from disagreements over the system's intended functions, the cost of providing the system, and the parties responsible for paying those costs.

Both the trucking industry and its regulatory agencies are made up of many elements. These elements are sensitive to different aspects of the regulatory process and these differences negatively impact the ability of states to select and implement IVHS CVO technologies for achieving transparent borders. For example, some trucking functions are very time sensitive. To firms engaged in those time sensitive businesses, time savings will measurably reduce the cost of doing business and/or increase their competitive position in the industry. Other trucking functions are not very time sensitive;

thus, the time savings promised by some IVHS CVO technologies (such as automated ports of entry) will not have a measurable impact on the bottom line of companies engaged in those trucking functions.

As a result, the trucking firms that will gain measurable benefit from time savings at an automated port will be far more likely to be willing to help pay for the cost of constructing and operating a port than will firms that will not benefit financially from the facility. The result of this situation is that most firms agree that IVHS CVO technology is a good idea (saving time is "good"). However, these firms are reluctant to press for the "whole" system, as many of the benefits generated by IVHS CVO technology will not directly improve their bottom line.

State agencies have a similar perspective on IVHS CVO. IVHS CVO is generally viewed positively; however, the costs of funding much of the needed infrastructure are difficult to justify against the measurable benefits the agency may gain. The difficulty justifying IVHS CVO infrastructure is partly based on the fact that IVHS CVO benefits will cut across traditional lines of agency responsibility. Thus, many of the benefits from IVHS CVO technologies are not reflected in the traditional performance measures of the state agencies.

The end result of the wide variety of expectations for and perspectives on IVHS CVO is that no single vision of what IVHS CVO is or should be has emerged. Consequently, there is no agreed upon goal to work towards, no momentum for getting there, and little direction on how and where to proceed. When these factors are combined with an economic climate that encourages cost reduction and discourages risk taking with expensive new technologies, small institutional barriers are sufficient to limit the implementation of these new, beneficial technologies.

The project team has reached the conclusion that the only way to surmount the barriers produced by the above conditions is to create a modular system that will allow both states and private companies to enter into the IVHS CVO process for little cost. The

system will then have to be expandable to allow its capabilities to grow as the benefits from IVHS CVO technologies become more apparent and as funding becomes available.

The initial system must be simple, low cost (for both states and trucking firms), relatively easy to implement, and flexible enough to meet the needs of different states and state agencies. Finally, benefits commensurate with the costs of participating in the system must be available to all involved agencies and trucking firms.

RECOMMENDATIONS

The project team recommends that Montana participate in the development and operation of a simple, modular, electronic credentials verification system. This system can be developed and implemented either as part of a national effort within the IRP or IFTA structures, or as a regional effort by the states in the West that can later be extended to the rest of the country, starting with the I-80 and I-84 corridors.

To adopt the IVHS CVO approach described in this report, Montana will need to pursue the following three actions:

- create (with the other participating states) a regional/national electronic repository for interstate vehicle and carrier credentials,
- substitute an electronic license plate, electronic database entries, and a single piece of paper issued only once for the annual paper credentials (IRP, IFTA, interstate operating authority, proof of insurance) currently carried in each tractor, and
- create an electronic verification system that combines the data from the central repository with the electronic tags.

The project team recommends that the repository contain IRP, IFTA, interstate operating authority, and insurance filing information for all vehicles equipped with electronic tags. The repository should initially receive and transmit information from each of the participating states at least once per day. This frequent transmission of information will assist states in detecting carriers that are not operating in compliance with interstate regulations, while ensuring that carriers in compliance are not unnecessarily stopped.

The electronic license plates should replace existing apportioned plates and IFTA stickers. It is important that the tag replace the current paper credentials as well. This will provide the trucking industry with real administrative savings and allow it to purchase the electronic license plates. Because the tags' purchase will be funded by the industry, a major cost to the participating states will be eliminated.

It is also important that the participating states select a single electronic tag standard. At this time, it is not important which of the electronic tag standards (Amtech, HELP, etc.) is selected, as long as the tag is inexpensive, can be made part of the license plate, and works accurately and reliably. To promote the acceptance of these technologies, FHWA should "hold harmless" this standards decision. That is, the FHWA should agree that if no national standard exists when the tags must be purchased, and if the tag system the participating states (with FHWA input) choose is not later selected as the national standard, the FHWA will help pay to replace the tags and reader devices.

Finally, Montana must work with the participating states to develop the credentials verification system needed to utilize the electronic tags and the data in the national/regional repository. In Montana, this system can either be built into a central database in the state, or it can be developed as a much simpler system designed specifically to provide credentials verification, as discussed in Chapter 4 of this report.

Once the basic verification system is in place (electronic tags on trucks, interstate transfer of credentials information), Montana can add capabilities to it. These capabilities may include additional automated weighing facilities, the verification of state credentials, and other truck regulatory or reporting functions as desired (and paid for) by state agencies.

Finally, as newer technologies are developed, the basic verification system can be enhanced to provide the following capabilities: improved truck safety, driver license verification, and log book verification.

CHAPTER 1
INTRODUCTION

Some of the most significant improvements that can be expected from the intelligent vehicle-highway system (IVHS) initiatives and technologies involve commercial vehicle operations (CVO). These new technologies and programs offer substantial improvements in the operational efficiency of shipping and trucking firms and the public agencies that regulate, administer, and interact with them.

Many of the IVHS technologies that are available commercially can provide monetary benefits to both public agencies and the trucking industry. However, while the introduction of these technologies is technically feasible, substantial barriers prevent their immediate implementation. These barriers include physical limitations in the existing facilities (e.g., insufficient land to install sorter scales at weight enforcement stations), resource constraints, antiquated computer systems (i.e., in some cases old computer hardware and software, and in other cases, limitations in the existing computer software capabilities), manual record keeping, administrative and legislative restrictions on the collection and dissemination of information and money, and the general inertia to change that affects most large organizations and governments.

This project, sponsored by the Federal Highway Administration (FHWA) documents the barriers that exist in the area of transparent borders. The project is designed to give each participating state the information necessary to establish a plan for implementing the transparent border technologies that it finds most beneficial.

REPORT OBJECTIVES

This report provides a state specific review of the IVHS CVO technologies that appear to be appropriate for this state. It describes the barriers to implementing those technologies and the potential methods for surmounting those barriers. The report is intended to serve as a blueprint for state agencies to use to successfully and incrementally

improve the efficiency of their regulation of the trucking industry, while also allowing trucking firms to improve their own efficiency.

OTHER PROJECT REPORTS

This is the second state specific report for this project. A similar report is being produced for each of the seven states (Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming) participating in this project. In addition to these reports, a final report that provides a regional perspective of these blueprints will be produced at the end of this project. An earlier set of reports produced for this project (one report for each state) provided an overview of the trucking industry and the regulatory requirements within each participating state. These reports are available from the department of transportation of each of the participating states.

REPORT ORGANIZATION

This report consists of six chapters and begins with a summary of conclusions and recommendations. The second chapter characterizes the basic problems that transparent borders are meant to resolve. The third chapter presents a summary discussion of the kinds of implementation barriers that should be expected as the proposed transparent border systems are implemented and operated.

The fourth chapter describes the basic processes that the project team believes should be incorporated in the implementation of transparent borders within this state. This description includes a step-by-step implementation plan.

Chapter 5 describes the specific barriers that will need to be overcome in Montana for the proposed implementation process to be successful. These barriers include those that occur at both the state and national levels.

The final chapter of the report describes the actions the project team recommends for each state. This includes a step-by-step state-specific action plan. This plan is limited in detail as a result of the project's scope and budget.

CHAPTER 2
CHARACTERIZATION OF THE PROBLEM

State and federal agencies regulate interstate trucking to ensure safety and to collect user fees and taxes. The specific regulatory requirements, the policies and procedures adopted for implementing them, and the organizational structure for administering them make up the institutional environment within which interstate trucking operates. This institutional environment varies from state to state, creating administrative duties and operational complexity for both the trucking industry and state agencies. These administrative duties and operational complexities are the "problems" that transparent border technologies and systems seek to address. These problems are characterized in this chapter from the perspectives of both the trucking industry and state government.

The main problem areas in which transparent border technologies have potential to provide significant benefits to the states and industry as well as the issues of concern voiced most frequently during the conduct of this project include the following:

- congestion at POEs and other fixed weigh sites,
- delays to trucks at fixed weigh sites,
- high volumes of paperwork ,
- administrative complexity,
- enforcement constraints,
- staff/equipment productivity,
- competitive advantages for non-compliance or non-participation,
- increasing costs of doing business,
- complexity of driver responsibilities,
- the increasing consumer orientation of the business, and
- the effectiveness of safety programs.

Each of these subjects is described briefly below.

CONGESTION AT POES AND OTHER FIXED WEIGH STATIONS

States operate fixed weigh stations (ports of entry are fixed weigh stations operated at major border crossing points) on highways to facilitate, monitor, and enforce compliance with their regulatory requirements. The level of automation and the

information requested at these fixed sites varies from state to state and from location to location. However, common to many fixed sites is the periodic congestion caused by trucks arriving faster than they can be processed. This backlog forces trucks to stop and wait on the ramps leading to the scale house. Where traffic volumes are high relative to processing time, the queue of waiting trucks can extend close to, or on to, the main highway, interfering with highway operation and safety.

Congestion at weigh station ramps causes problems for both the industry and state agencies. Ramp queues, particularly if they extend to the main highway, are also a significant safety hazard. However, actions usually taken by the weigh station operators to reduce queues result in a substantial decrease in the effectiveness of the regulatory and enforcement duties performed at the site.

To avoid creating hazardous queues, the agency operating the station either shuts down the station's operation until the queue of trucks has been reduced, or shortens the processing time allocated to each vehicle. Closing the station allows illegally operating trucks to bypass the scale, while shortening the processing times results in a greatly reduced level of credential verification and safety inspection. Currently operators can only shorten processing times by reducing the number of regulatory and safety tasks they perform (i.e., only checking some credentials, not performing visual safety checks, etc.) Consequently, ramp congestion restricts state agencies from performing the weigh station tasks that are necessary for thorough verification and inspection.

Industry also suffers from congestion at the fixed weigh stations. Long queues at fixed sites cost trucking firms money as a result of

- the cost of labor, both from waiting in the queue and from being unable to use that labor for making additional trips,
- the cost of fuel burned while idling and accelerating from one place in line to the next, and,
- the cost of added vehicle wear and tear caused by excessive stopping and starting.

These costs are magnified when a truck must pass through several fixed weigh stations in a single day or during a single trip.

Transparent border technologies are designed to both increase the speed of performing the necessary regulatory checks at fixed weigh stations and reduce the need for some of those checks at fixed sites. Use of these technologies limits the time needed to process trucks through an operating site, reduces the potential for queues, and increases the number of vehicles that can be checked for a given level of staffing.

DELAY TO TRUCKS AT FIXED WEIGH SITES

One of the primary features of conventional fixed weigh stations is the use of static scales to weigh a truck's axles. However, weighing a vehicle statically, while accurate, can be time consuming and resource wasting for the trucking industry, even when significant queues do not form at the weigh stations.

Transparent borders technologies, such as weigh-in-motion systems, are designed to speed the vehicle weighing process, both by providing higher speed weighing systems, and by transferring data about a vehicle's weights from one location and/or jurisdiction to another; data transfer eliminates the need for a vehicle to be repeatedly stopped.

VOLUME OF PAPERWORK

Ensuring compliance with the regulatory requirements regarding safety certification, vehicle permitting, size and weight laws, operating authority, licensing, registration, user fees, fuel and other taxes, and driver licensing, generates considerable administrative effort on the part of both the trucking industry and the government agencies that regulate them. Trucking industry personnel must obtain the necessary paperwork to comply with the regulations in each state. This process can involve a number of steps that are often repeated at, and by, multiple state agencies.

Trucking firms must comply with all of the regulatory requirements in each state they pass through. This increases the paperwork each firm must perform and their

administrative burden. Drivers must carry a large portion of the paperwork with them, and often need home office support to obtain that paperwork, as well as to address questions or issues that arise during the course of a journey.

Each state must monitor compliance for all commercial vehicles that operate within its borders. Within each of the states, multiple state agencies monitor compliance and maintain paperwork for those commercial vehicles. The need for paperwork among these multiple state agencies often results in a considerable duplication of record keeping, data entry, and paper handling, both within the state agencies and within the trucking firms that must work with those agencies.

Several transparent borders technologies are aimed at reducing the paperwork required to ensure regulatory compliance, vehicle and public safety, and tax collection. These technologies work by increasing the ease with which data can be transferred and shared among users, while maintaining the data's security and accuracy.

ADMINISTRATIVE COMPLEXITY

Related to the volume of paperwork is the complexity of the administrative burden trucking firms must bear. Many of the regulations governing truck use change from state to state. This makes it difficult and expensive for trucking firms to track and maintain the appropriate credentials required for operating in multiple states.

Several of the transparent borders technologies are intended to reduce the complexity of interstate trucking through better information transfer and through the standardization of procedures and rules.

COMPLEXITY OF DRIVER RESPONSIBILITIES

Commercial vehicle drivers are often directly confronted with the complexities of differing state regulations. Drivers must currently carry much of the regulatory paperwork with them in their vehicles, and are responsible for maintaining a log of their actions. The complexity and differences in requirements among states adds to the

complexity of the drivers' duties. When the regulatory papers carried with a vehicle are not in order, the drivers must resolve complex regulatory problems that they may not fully understand.

This need to manage paperwork detracts from the more important task of driving the truck safely and efficiently. The industry has high driver turnover, and the complexity of paperwork requirements may well contribute to this problem. Because staff turnover increases the cost of doing business, many trucking firms are looking to transparent borders technologies for ways to simplify the driver's tasks, provide the driver with the information needed throughout the trip, and provide easier access to information and expertise available at company offices.

ENFORCEMENT CONSTRAINTS

Limitations on staffing and resources, combined with the complexity of the trucking industry's regulatory/enforcement process, result in a number of significant constraints on the level of enforcement states can perform. Consequently, different states and state agencies provide a variety of enforcement levels.

Laws are written and enforcement actions are taken to ensure that vehicles

- are being maintained in a safe condition,
- are being operated in a safe manner,
- taxes are being paid,
- have been properly registered and licensed,
- are being driven by a driver with the appropriate training,
- have a driver that is not exceeding legal hours of service, and
- are being operated within the law.

Because enforcement resources are limited, rules, regulations, and laws are often unevenly enforced, providing incentives for some trucking firms and/or drivers to circumvent those laws. This results in unsafe highways, decreased tax revenue, and unfair competitive advantages for firms that violate the law.

Transparent borders technologies are designed to improve the states' ability to enforce the existing laws and regulations more effectively and fairly, while not increasing the cost and burden this enforcement places on trucking firms operating legally or

increasing the resources necessary to perform the enforcement function. Most of the transparent borders technologies are designed to increase the productivity of existing staff and to be implemented with little or no increase in staffing levels.

STAFF/EQUIPMENT PRODUCTIVITY

Many of the current procedures associated with interstate trucking regulation cause resources to be used inefficiently. Incentives to improve staff productivity and equipment exist for both the trucking industry and state agencies. The competitive pressures on the trucking industry are enormous, and all firms look for ways to both improve the service they provide to customers and reduce their cost of doing business. At the same time, substantial legislative pressure exists on state agencies to both keep costs and staffing levels down and improve law enforcement while simultaneously enhancing the state's business climate.

Many of the inefficiencies that plague state agencies and private firms stem from the same sources. Delaying legally operating vehicles to check compliance with regulations reduces the efficiency with which trucking firms can use those vehicles and drivers. The more time that is needed to check a legal vehicle, the less time is available for state agency personnel to check whether other vehicles are operating legally. Thus, a reduction in the time required to verify a vehicle's status is beneficial to both states and trucking firms. Duplicate information entry by different state organizations requires extra staff time for both the agencies and private firms, each of which must handle twice the paperwork that is really necessary.

Many transparent borders technologies are designed to increase the utilization of existing resources for both private firms and public agencies by

- reducing the time required to perform law and regulatory enforcement actions,
- eliminating paperwork duplication,
- automating tasks that are currently done by hand, and

- reducing the administrative overhead required from both trucking firms and state agencies.

The intended result is a less costly business environment that rewards firms that operate legally and penalizes firms that operate illegally.

COMPETITIVE ADVANTAGES

A significant concern of the trucking industry is that the current regulatory/enforcement process often provides incentives to firms to operate illegally. Firms that operate legally are at a competitive disadvantage in relation to firms that are not meeting tax and safety regulations, especially if those illegally operating firms are not likely to be caught.

Many of the transparent borders technologies are designed to "level the playing field." For example, some technologies are intended to provide trucking firms with an opportunity to easily prove they are operating in a safe and legal manner. This limits the delays imposed on legal vehicles and frees enforcement personnel to focus on vehicles that are not operating legally, which are then stopped and inspected. As a result, firms that willingly demonstrate their legal operation are given competitive advantages over firms that are not willing to provide this proof.

CHANGES IN THE COST OF DOING BUSINESS

As indicated above, both state agencies and private trucking firms are under considerable pressure to both reduce the cost of doing business and improve the level of service they provide their customers. Transparent borders technologies are designed to provide a framework within which both private and public agencies can build more efficient, cost-effective product delivery systems.

At the same time, the economic pressure on both state and private entities is strong enough that many companies and agencies are only willing to invest in technologies that provide immediate payoffs to their bottom line.

CONSUMER ORIENTATION

Part of the improvement to a company's bottom line can come from new services that customers purchase, rather than simply from reductions in the cost of doing business. As part of their search for competitive advantages, private trucking firms look for new services that can be provided to customers for a profit.

In the last twenty years, the package delivery industry has made substantial strides towards providing new services to their customers, from the delivery of packages overnight to the ability to track the location of specific packages throughout the entire transportation network. These services are part of an increasingly important customer service orientation that has transportation firms looking for new ways to attract customers.

Similarly, many state agencies are looking at their procedures to determine whether there are better methods of providing better service to their customers, the taxpayer or user. The pressure comes from trying to provide a better state business climate in order to attract more industry and jobs. As a result, customer service ideas, such as one-stop shopping, have received attention and support within many states.

Transparent borders techniques and systems provide a framework that allows many new services to be developed and delivered to customers of both state agencies and private firms.

EFFECTIVENESS OF SAFETY PROGRAMS

Both the trucking industry and state agencies have a strong interest in the safety of their trucks and the effectiveness of safety programs. Trucking firms are concerned about the safety of their drivers, the safety of the public, and the costs associated with unsafe operations (liability, insurance, damage claims, etc.).

States are charged with ensuring the safe operation of the transportation facilities. While truck accidents are a small proportion of all accidents each year, truck accidents tend to be more costly, more visible, and more likely to cause serious injury or death.

Therefore, states are very interested in ensuring that the trucks using the highways are in good working order, have been properly maintained, and are operated safely.

Transparent borders technologies have the potential to significantly improve both a state's and a trucking firm's knowledge of the operating condition of a vehicle. This knowledge is gained through the use of new vehicle components that monitor the condition of truck safety systems (such as brake conditions) and by improving state agency personnel's ability to detect and inspect trucks suspected of having safety defects.

CHAPTER 3
IMPLEMENTATION BARRIERS

As a result of the extended discussions the project team had with state agency personnel, federal highway administration officials, a variety of trucking industry personnel, and various state and national trucking industry groups, a clear understanding of implementation barriers to IVHS/CVO technologies was developed. This chapter provides a broad overview of those barriers.

To a limited extent, each of the barriers discussed below occurs in each of the participating states. However, the degree to which each of these problems is truly a barrier differs from state to state and from subject to subject within the scope of the various transparent border technologies. This chapter describes the basic barriers found. Chapter 5 discusses in detail the degree to which these barriers affect transparent borders implementation in the state of Montana.

INTRODUCTION TO BARRIERS

The project team believes that it is most descriptive to divide the barriers to transparent borders implementation into two basic levels, strategic and tactical. The term *strategic barriers* refers to a group of problems that exists at the higher levels of decision making in each of the participating states, industry groups, and the federal government. Conversely, *tactical barriers* refers to issues that affect the day-to-day operational and planning aspects of the implementation process. Each of these types of barriers is discussed in detail below.

When this project started, the participants expected that the barriers to transparent borders implementation were mainly tactical in nature. These tactical barriers included such issues as

- interagency turf fights,
- poor resource allocation,

- differences in perspective and emphasis,
- legislative requirements, and
- a variety of other day-to-day barriers that restrict work completion in an interdisciplinary setting or that stifle innovative thinking.

What the project team found was that while these problems exist and are barriers to implementing transparent borders technologies, the strategic barriers are the more important source of resistance.

STRATEGIC BARRIERS

Four primary strategic barriers are preventing implementation of transparent border technologies in the western states. These barriers can be categorized as a lack of

- communications,
- compelling arguments for specific actions,
- standards, and
- leadership.

In many cases significant problems caused by one of these barriers exacerbate problems in other areas. For example, the lack of common standards makes it difficult to build a compelling argument for implementing a device or technology when that device or technology may soon become non-standard.

While all four of these factors are not present every agency or even every state, the presence of even one of these factors may prevent implementation of transparent border technologies. Where all four factors exist, very little progress is occurring. Where only one or two of the strategic barriers exist, some progress towards system implementation is usually being made.

Communications

One of the most ubiquitous barriers discovered by the project team is a lack of effective communications among the various agencies, groups, and individuals that need to be a part of the implementation process. Communication failures occur in a variety of places and for a variety of reasons.

The monitoring, regulation, and enforcement of the trucking industry is extremely complex. Communications problems are exacerbated by this complexity, in part because the complexity of the regulatory process requires a large number of agencies, people and systems to be involved. This, in turn, makes it difficult to include all of the appropriate persons in the communications process. Consequently many people who need to be involved with selecting and implementing transparent borders technologies are not involved, hampering the implementation process.

The communications problem is also hampered by the continual changing of personnel into and out of decision making positions. The size and complexity of the transparent borders process, particularly when examined across multiple states, create a situation in which decisions are routinely needed from a multitude of people. Many of them are either just stepping into new positions or are about to step down from their current position. This situation causes delays because

- decisions that were made by one person must be reviewed by that person's successor;
- individuals who must make the decisions lack the necessary background or are actively dealing with a number of other crises of equal importance; and
- positions responsible for making the decisions have not been filled.

The communications failures observed by the project team happen in two different ways. For this report, we refer to these communications failures as occurring either *vertically* or *horizontally*.

Vertical Communications

A vertical communication failure means that information is not being passed effectively through the vertical components of an agency's, or state's, organizational structure. The most important of these failures occurs early in the implementation process (where most states are now). The failure involves decision makers who are not sufficiently familiar with the transparent borders concept and its meaning for their agency or state.

In this project, the project team met primarily with middle and upper-middle level managers. These individuals are normally responsible for the operation of the individual functions affected by the proposed technologies. While these managers exercise control over budgets and procedures that affect their function on a day-to-day basis, most are not sufficiently empowered to control the funding or the decision making process required to implement the transparent border technologies. These decisions are made by upper level managers, who are not active participants in the transparent border discussions.

In addition, many of the tactical barriers described later in this chapter can only be overcome with leadership and decision making from upper level management. Yet, in many cases, these decision makers are not actively involved in the transparent borders discussions and are not actively supportive of the steps needed to implement these ideas.

To successfully implement these technologies, top level decision makers must be informed of the need for transparent borders. In addition, decision makers must realize that these needs not only outweigh the costs, but that the benefits are greater than the benefits that can be gained through other endeavors that are competing for the scarce resources they control.

An equally important strategic communications failure has been the inability to keep the trucking industry involved and supportive of the transparent borders process. The trucking industry is not well informed about the benefits and costs of transparent borders technologies, and it is suspicious of regulatory actions it does not understand. This communications failure prevents the industry from actively supporting the implementation effort and further limits the visibility of these efforts at higher levels of state and federal government.

Once decision makers have selected specific technologies and processes for implementation, they must also ensure that the vertical communications process proceeds to the lower levels of the organization chart. When the time comes for actual system

design process design, and implementation, the staff who will operate the system must "buy into" that system. This means

- educating them on how the new technologies/procedures will affect and improve their job performance,
- obtaining their input regarding the design process, and
- training them in those new tasks.

Without these three basic steps, the system is likely to be poorly designed and suffer from poor operational attributes. At the same time, the morale of the agency personnel is likely to be low, resulting in poor system performance.

Horizontal Communications

A horizontal communications failure means that information is not being transferred effectively within one organizational level of one or several similar agencies. For example, the managers responsible for operations and capital expenditures may work together and select the transparent borders technologies and systems to be implemented, but they may forget to include the agency's information systems manager in the decision making or design processes. This horizontal communications failure creates conflicts and delays in system implementation.

The transparent borders technologies are designed to impact a variety of regulatory functions: taxation, registration, safety, and operating authority. Personnel involved with each of these functions must be involved in the communications process. In addition, computer systems managers, computer maintenance groups (those who will maintain the electronics associated with the transparent borders systems), and other sections within each department/agency must be involved.

The sheer size and complexity of the regulatory/enforcement process makes the horizontal communications process very difficult. In many ways, the conduct of this study illustrates this barrier. This project was designed specifically to examine barriers to system implementation. However, the project team continually discovered that additional groups should have been interviewed or should have received copies of written material,

but were missed or overlooked because the project team was unaware that they differed in function or perspective from some other group included in the study. Horizontal communications will become even more important at the national level as standards are developed for sharing information between states and state agencies.

As transparent borders technologies proceed towards the design and implementation phase, failures to include personnel and agencies in the communications process will cause a variety of delays and errors in the design process.

Lack of a Compelling Argument

The second major barrier to transparent borders implementation is the lack of compelling arguments in favor of the various technologies and processes (i.e., the lack of an incentive or perceived benefit big enough to warrant doing something different, risky, and expensive). The existing arguments for transparent borders are in some cases adequate to gain specific adherents (that is, some people or agencies are convinced of the merits of some projects), but these arguments have not been expressed either to the right people (see communications) or, more often, with sufficient persuasiveness to convince many decision makers to implement these systems.

In the project team's discussions with the participating states and industries, very little outright resistance to the idea of transparent border technologies was expressed. Instead, the researchers found ambivalence. In part the reason for this ambivalence is the extreme difficulty of defining the concept of transparent borders. Without being able to specifically define the concept of what transparent borders included, the research team had difficulty generating strong feelings either for or against the concept.

The lack of compelling implementation arguments was well demonstrated by our discussions with industry representatives and groups. Most of the industry groups feel that transparent borders are a good idea, but someone else should pay for it. The standard response might well be paraphrased, "Its a good idea, but I don't really gain much. They do. So, they should pay for it."

A few situations have demonstrated the benefits (e.g., decreased staff requirements, increased public safety, decreased operating costs) and cost effectiveness of implementing transparent borders technologies in the work place. When direct benefits can be calculated, they are often not evenly distributed across the industry. For example, the value of bypassing ports of entry depends on the frequency with which a company's vehicles must stop at those ports. A company whose vehicles can make an extra trip each day as a result of bypassing existing ports will find this function far more valuable, and is more willing to pay for it, than a company that will simply save 10 minutes on a two-day trip.

In many ways, the implementation of transparent borders technologies needs a very obvious, and significant benefit to encourage implementation. This should be an argument so strong that decision makers can not ignore it. For example, "If I spend only $10 million, I can save $100 million per year in personnel, equipment, and fuel costs." Without this obvious benefit to cost relationship, decision makers will find it difficult, if not impossible, to divert scarce resources from areas that are traditionally funded.

The trucking industry might be able to wield sufficient political pressure to change traditional priorities; however, this is unlikely to happen if the industry does not see overriding benefits either. The research team's discussions with various industry groups and a number of carriers reveals that the industry is unlikely to have a sufficiently unified voice (or the self-driven incentive to use it) to achieve this result. As a result, trucking firms are unlikely to push, as an industry, for specific transparent borders implementation unless it too, can be shown an overriding positive benefit/cost relationship.

Standards

The third major strategic barrier to transparent borders implementation is a lack of standards for many of the technologies and proposed procedures. In those cases where top level decision makers have been convinced that transparent border technologies are

worth implementing, implementation has been halted or significantly delayed by the lack of standards for a wide range of subjects:

- vehicle transponders,
- communications protocols (both between vehicles and the roadside and between different state computers),
- data formats,
- forms and procedures,
- information collection and data transfer,
- penalties for non-compliance, and
- a variety of other subjects.

The end result is that even though decision makers see the benefits of a specific transparent borders technology, they are not convinced that these benefits warrant the expenditure of the resources and political capital necessary to achieve system implementation. This reluctance to spend scarce resources on new technologies is reinforced by the risk associated with implementing unproven technologies.

A considerable risk is present for a state (particularly a smaller western state) in the selection of a transparent border technology. As one state official said in one of the project interviews, "Imagine the furor if I got all of the truckers in my state to put on transponder A, which I could probably do, and six months later FHWA, or some other organization, decides that transponder B will be the national standard. It would never be remembered that I pushed the industry forward, or that I built a functioning system. It would only be remembered that I made the trucking industry bend over backwards and then had to go back to them again and say, 'Whoops, let's start this all over, and by the way, you need to help pay for this second set of transponders too.'"

Leadership

Lack of leadership is the final strategic barrier to transparent borders implementation. A strong leader provides the best method for resolving the first three barriers, but the seven participating states are unanimous in their opinion that leadership

is lacking at the national level on the subject of transparent borders. They are looking for that leadership to help resolve the strategic barriers to transparent borders implementation.

The states in this consortium are, for the most part, too small a market to define a national standard for AVI transponders (note the failure to date of the HELP AVI standard). If a national standard for such a device was developed, regardless of the technology selected, a variety of state transparent border initiatives would proceed.

Similarly, the states are looking for direction regarding the technologies to implement and assistance implementing those technologies. The states perceive a lack of leadership because the federal government (and everyone else) has not provided sufficient information on the specific benefits to be obtained from specific technologies or defined the specific technologies that should be implemented. In addition, they perceive the lack of a "crusade leader" who is actively pushing the implementation of specific programs or projects.

In many respects the leadership desired by the states is similar to that provided by the federal government for the CDL program. The states want the government to step in and to state that specific actions will take place within a specified time frame; the states are then responsible for developing the details of that implementation. The federal government's role is to provide the necessary carrots and sticks to ensure that progress is made. Such an approach provides incentives states need to ensure communication among various agencies. The inclusion of realistic deadlines also forces states to continue to act on new system implementation, rather than waiting for some other state to resolve all of the potential problems.

Strategic Barriers Summary

None of the four strategic barriers alone has stopped the implementation of transparent borders. However, in combination, they are the primary impediment to progress in this area. This is not to say that the traditional "tactical" barriers (described

below) do not exist or are not major impediments to implementation. It means that if major decision makers (e.g., the governor) decide to make something happen, it happens. To get that type of support without resolving the strategic barriers discussed above is unlikely. Finally, because of the wide range of agencies, industries and interest groups involved in transparent borders, it is unlikely that a unified group will coalesce around a specific topic. Therefore, top decision makers must push for these types of changes to raise the visibility of these subjects. If decision makers remain quiet, the inertia of the existing systems and procedures will continue to dramatically slow the implementation process.

TACTICAL BARRIERS

While the project team believes that the primary causes of the slow implementation of transparent borders technologies are the strategic barriers described above, they also know that tactical barriers still exist and will continue to play an important role in delaying system acceptance and implementation. As described above, tactical barriers are issues that occur at the operational level and that hinder the selection, deployment, and operation of transparent borders technologies. This section of the chapter discusses the tactical barriers that were the most apparent in the project team's review of potential transparent borders systems.

To help clarify the discussion of tactical barriers, this section has been divided into two parts. The first part addresses barriers that frequently occur within one state as different agencies attempt to jointly perform new tasks. The second group of tactical barriers exists as a result of different states attempting to work together.

Within States

A variety of barriers exist as different agencies and groups work together. Generally, the more disaggregate the organizational structure is within a state, the more likely it is that tactical barriers will exist to hinder new system implementation.

Common tactical barriers that occur within a state include the following:

- high cost of implementing transparent borders systems,
- imbalance of resources,
- bureaucratic inertia,
- differing perspectives and priorities between agencies/groups,
- turf,
- regulatory and legislative limitations,
- resistance to change within organizations,
- lack of technical capability,
- physical and/or geographic constraints,
- lack of automation within organizations, and
- duplication of regulatory responsibilities.

Each of these issues is discussed in detail below.

High Cost of Implementing Transparent Borders Systems

One of the primary barriers to the implementation of transparent borders technologies is the cost associated with their installation. The obvious costs required for transparent borders implementation usually include, at a minimum, the following:

- the cost of creating or revising existing computer systems,
- the cost of vehicle tags, and
- the cost of system infrastructure (computers at field sites and central offices, and communications between those points).

Training costs for personnel, the management costs for setting up new procedures, and the maintenance costs associated with operating the new systems also add to the total cost of the system, but they are often not as highly visible when decisions concerning transparent border systems are being made. In most cases, implementing transparent border systems is reasonably expensive, making it difficult for agencies to find the funding for system implementation.

A lack of funding to purchase and install transparent border systems holds equally true for both state agencies and the trucking industry. Individual agencies and/or firms often have the resources to fund specific IVHS transparent border components. Unfortunately, these components are often only functional as part of a larger system. This larger system requires additional funding from other agencies/firms that do not have sufficient discretionary funding to meet these needs. The result is that no system is built.

State agencies have two basic resource problems. The most common problem is usually experienced by regulatory and enforcement agencies that have little discretionary funding built into their annual budgets. These agencies are usually affected most by the implementation of the proposed systems, but they have an insufficient discretionary budget to construct the infrastructure needed to make the system operational.

The second resource limitation is primarily associated with highway agencies. Because they have larger "discretionary" budgets, highway agencies have sufficient funding to build the necessary infrastructure. However, the highway agency divisions that deal with commercial vehicles (usually the oversize/overweight permitting function) frequently fail to obtain the allocation of those funds, both because the highway agency stands to gain little political capital from these systems and because the permit sections have insufficient political clout within the agency. (See imbalance of resources below.)

On the industry side of the funding equation, funding is available from individual firms only if the expenditure of those funds leads to a direct improvement in the bottom line of the company, either through a measurable reduction in costs or through a sufficiently large increase in revenue.

Specific trucking firms hauling specific types of commodities stand to obtain significant financial benefit from individual transparent border technologies and scenarios. These firms are willing to pay for a portion of the system implementation cost; however, these firms operate a fairly small percentage of the total truck fleet. In addition, the largest benefits to these firms, and thus the benefits they are willing to pay for, can be obtained only from the most sophisticated and/or geographically distributed system; both sophistication and geographic distribution result in higher installation costs.

Most trucking firms see only limited benefits from the majority of transparent border technologies. In addition, many of these benefits are difficult to quantify financially. This inability to quantify financial gains makes these firms reluctant to

contribute to the cost of system construction, and this negative reaction is intensified by the current tough economic climate most firms are facing.

Imbalance of Resources

None of the seven states participating in this study lacks the resources to build the transparent borders systems discussed in Chapter 4. The necessary resources are available as part of the DOT funding allocated through ISTEA, in combination with the resources currently available to the individual states.

However, each of the participating states has considerably more funding needs than available resources, and the transparent border systems must compete with these other funding requirements. Furthermore, as mentioned above, the state agencies that benefit most directly from the early stages of transparent border implementation, in most cases, are the least likely to have the discretionary funding necessary to build these systems. Thus the total cost of a transparent border technology is not the only issue. Another issue is how the benefits from those systems relate to the political pressures of the agencies that have the resources to implement those technologies.

Often, to obtain additional discretionary funding, an agency is placed in the position of either soliciting money from another agency, by convincing the second agency's top decision makers that its needs are greater than the funding agency's own needs, or working through the legislative process. Both attempts frequently prove futile, particularly in tight economic times, resulting in failure to implement the system. Funding problems also arise when the funding and implementation agencies perspectives differ. (For example, one may be primarily an enforcement agency, while the other is a service agency.)

Bureaucratic Inertia

Another of the common barriers to implementation is the difficulty in obtaining agreement on complex issues and system designs among multiple bureaucracies. The more complex the organizational structure, and the larger the number of decision makers

that need to agree to a system design or plan, the longer it takes to reach agreement on that design or plan.

Because the commercial vehicle operations portion of IVHS covers a large number of regulatory functions, even in the most simply organized states, the decision making process must work its way through three divisions of the transportation department. In some eastern states, as many as ten separate agencies must be incorporated in the decision making process. In addition, the wider the distribution of responsibilities is within a state, the more diffuse the support for the transparent border systems, and the less likely there is to be an agency strongly pushing these technologies.

When decision making personnel within any of the participating agencies or groups change jobs, even when being promoted within their own agency, decisions must also be delayed while the new staff person becomes familiar with the issues. Worse yet, as new staff enter the decision making process, decisions that had previously been made may be changed.

Again, the greater the complexity of the system being implemented and the higher the number of agencies or groups involved in the decision, the more likely delays are to occur.

Differing Perspectives and Priorities Among Agencies/Groups

Another barrier is the differing perspectives of the agencies involved in truck regulation. The differing perspectives of agencies and industry groups causes animosity and distrust and leads to resistance to change. For many issues, groups take the position, "What are they trying to do to me now? What are they trying to get away with this time?" rather than looking at new systems as a means of gaining benefits for all parties. This creates significant resistance to new products and systems.

For example, a system designed to speed truck flow through a port of entry may be viewed by a trucking firm as a way to reduce operating expenses. Enforcement personnel, however, may view the system as a hindrance to the effectiveness of visual

inspections. Similarly, the creation of a system that increases a state's ability to verify a truck's credentials may be viewed by a trucking firm as a method for increasing its tax exposure.

Even within state agencies, what may be viewed by one agency as a means to streamline the regulatory process may be viewed by another agency (or division within an agency) as an attempt to reduce control over its portion of the regulatory process.

Negative reactions take place any time an agency or group determines that some aspect of a system is not in its best interest. These negative reactions slow the acceptance of, and create outright resistance to, new technologies and systems. Where the acceptance of these systems is only marginal to begin with, a limited amount of vociferous opposition can stop system implementation indefinitely.

Turf

While most agencies downplayed the issue of turf in our project interviews, most agencies are territorial about the functions they normally perform. Defensive reactions and turf battles can be expected over any new system that reduces an agency's control over a function it performs.

Many questions have the potential to generate turf battles between agencies. These may include:

- Who controls the joint system?
- Who is responsible for building it?
- Who operates it?
- Who maintains it?
- How does the joint system interact with the other existing systems?
- Who contributes to the system design?

The presence and severity of turf problems differ significantly from state to state, depending on the existing level of interaction between the participating agencies, the agencies' existing organizational structure, the level of interaction already occurring between those agencies, and the individuals in charge of those agencies.

Regulatory and Legislative Limitations

Presently regulatory and legal barriers do not appear to be significant problems in the seven states participating in this project,. However, the research team believes that these barriers will become more important as the sophistication of the transparent borders systems grow. In specific instances, existing regulations and laws prohibit some types of IVHS activities; for example, the paperless tractor, which requires changes to some state regulations so that electronic media can be used in place of paper.

There are two types of regulatory/legal barriers: those that are part of state and federal statutes, and those that are part of administrative codes adopted by specific agencies. For the most part, administrative codes can be changed without significant delay or problem, as long as there is a convincing argument justifying those changes. However, regulatory changes that require action by a state legislature can be expected to take both time and effort.

Furthermore, in many states the legislature only meets every two years. If the legislative changes are deemed necessary, projects could easily be delayed for two years or more.

Resistance to Change Within Organizations

One of the most common barriers the project team found in its discussions with state agencies is a basic resistance to change. A common attitude among interviewed personnel is best illustrated by the hypothetical statement, "If we do it that way, we'll lose this." This sentiment was expressed most frequently by enforcement personnel, who were often reluctant to look at the positive new capabilities a transparent border technology had to offer them. Instead they concentrated on the technology's inability to perform some other function in the manner they were accustomed.

In many cases, the project team found it possible to successfully argue that the new methodology would provide significant benefits that would outweigh the "losses" caused by the procedural change. In general, the more forward looking the individual

and/or organization was, the more agreeable they were to these arguments: the more "conservative" the attitude towards job performance was, the more likely was the resistance to change.

In most cases, this resistance was found at the lower levels of organizations (i.e., the field personnel). However, when these attitudes exist at the upper levels of organizations, significant implementation delays can occur especially if the people with those attitudes are in decision making positions.

Lack of Technical Capability

One of the concerns voiced by agencies the project team met with concerned their staff's ability to maintain the equipment and systems implemented under the IVHS CVO initiative. These concerns centered both on maintenance costs, and on the skills needed to perform that maintenance. The maintenance function requires two sets of skills many organizations lack. These skills involve electronic component maintenance and computer software maintenance.

Most of the more sophisticated transparent borders technologies rely on fairly sophisticated computer components located on the roadside, in the vehicles and in the weigh stations. To keep this equipment operating, most agencies need to hire additional electronics technicians. It is not clear whether highway agencies' existing electronics maintenance staffs presently used to maintain signal systems and traffic counters have the skills needed to maintain the new equipment.

The ability of agencies other than highway agencies to provide the personnel or the training to effectively perform this function is even less certain. In several states, the agencies most likely to be responsible for operating a credentials verification system do not currently maintain equipment in the field. In these cases, the agencies would have to hire a new "class" of worker just to maintain the system. They would also have to develop the necessary training for those individuals and provide them with the necessary

equipment to perform the diagnostics and repair associated with electronic component maintenance.

The widespread introduction of weigh-in-motion technology in the past few years has demonstrated the difficulty and cost inherent in training maintenance forces in the proper procedures for maintaining modern electronics. State experiences in trying to install, calibrate, maintain, and use WIM technology can also be good indicators of the difficulties to be expected with the transparent border systems.

As important as maintaining the field equipment is the need, or the ability, to modify the software that operates the transparent borders system as new requirements and/or needs become apparent. Several of the agencies interviewed expressed concern over their ability to maintain new software using their own personnel. Because of either a lack of staff or because the new software is expected to be too complex for their own software personnel, agencies were concerned that they would have to hire outside contractors to perform these updates.

Concern about state agencies' ability to maintain the transparent border technologies leads to further resistance to system implementation. Such concerns make a greater benefit to cost relationship a must in order to "sell" decision makers on these technologies.

Physical and/or Geographic Constraints

In several states, physical constraints either preclude the implementation of some transparent borders technologies or greatly increase the cost of their implementation. For example, a common problem is that most existing fixed weigh stations are not designed to accommodate the medium-speed WIM scales and bypass lanes required to create traditional, medium-speed sorter scale operations. When this problem occurs, the cost of additional land (if any land is available at all), and the new construction required to convert a single conventional scale to sorter operation can exceed the total cost of

electronics, computer systems design, software development, and procedural changes that allow the operation of sorter systems on a statewide basis.

Another common constraint is the physical separation of agencies that interact with the trucking industry. No law prevents these agencies from moving their personnel to locations that would reduce the time and travel required for trucking industry staff to complete regulatory paperwork. However, the moving costs, both in actual dollars and in the disruption of work patterns, are one more deterrent to transparent borders systems. These deterrents are often significant enough that agencies decide not to move units together in order to save money for some more important task.

The physical separation of groups also leads to an "us versus them" mentality in agencies that ought to be cooperating. This is particularly true when the agencies have significantly different perspectives. For example, one agency may have an enforcement perspective, while another may have an industry service perspective. The results can be an increase in the level of distrust between agency personnel, a decrease in the cooperation provided, and an increase in the likelihood that small problems will become big problems.

Lack of Automation Within Organizations

Another stumbling block towards transparent borders implementation within a state is a lack of automation among agencies. Many of the agencies included in this study are still performing a significant amount of work by hand. This is particularly true of enforcement officers.

Perhaps more importantly, a number of states have experienced significant problems as a result of trying to automate. These problems include significant delays in obtaining software, inadequate software performance once it has been obtained, poor system design and inappropriate equipment selection. These "bad experiences" with automation reduce the willingness of agencies to accept new technologies, particularly when those new technologies are not well proven elsewhere in the country.

In many instances, benefits that were initially touted to justify the cost of automating current systems have not been realized. Finally, the agencies can not readily change some of the automated (i.e., computer) systems being used. This problem is partly due to a lack of funds, but it can also be attributed to the cumbersome task of contracting out programming changes or to the inability of in-house computer staff to modify programs developed by outside vendors.

The result of these automation problems is the creation of additional barriers to the implementation of transparent border systems. Agencies that are not currently computerized must simultaneously adapt to both computerization and the new operating situation made possible by the transparent borders technologies. Agencies that are computerized must change their existing systems without degrading the service those systems supply. Both of these situations lead to reluctance on the part of agencies to push for transparent border systems.

Duplication of Regulatory Responsibilities

The final in-state barrier discussed in this chapter is caused by the duplication of regulatory functions among several agencies. For example, both a private and government agent may handle the paperwork for some function, such as permitting, or two agencies may duplicate specific functions, such as inspecting vehicles.

This distribution of responsibilities/functions makes it more difficult to implement technology driven improvements; if all disparate groups do not obtain the technology simultaneously, more than one set of procedures will be used simultaneously. This disparity causes confusion for both industry and the participating agencies. Confusion resulting from this duplication of regulatory functions, the difficulty in handling two or more sets of operating procedures, and the cost of equipping personnel from multiple agencies all result in reluctance to implement new technologies.

Among States

In addition to the problems barriers cause one state's agencies, tactical barriers hinder cooperation across state lines. In some cases, the barriers are different manifestations of the barriers already discussed: for example, differences in perspectives between states. One state may desire to improve tax collection, while another may want systems that increase safety or improve trucking fleet efficiency. Other barriers are due to differences in attitudes and philosophies between states, differences in agency organization, and differences in the procedures each state follows.

Among the more common barriers states encounter as they try to develop multi-state systems are

- variation in regulatory requirements,
- incompatible equipment,
- variation in policies and practices for executing transparent border related functions, and
- lack of standards for advanced technologies.

Each of these broad subject areas is discussed in more detail below.

Variation in Regulatory Requirements

A common theme in the trucking industry for the last few decades has been "uniformity." Unfortunately, like transparent borders, this term means different things to different people. In essence, all parties involved in interstate trucking are frustrated by the lack of consistency in the regulatory requirements of different states. Most groups desire more consistency between states, so long as that consistency is achieved by other groups changing to meet their current system.

The great variation in requirements from state to state also plays a significant role in the delay of transparent border system acceptance and implementation. Because each state has different needs, requirements, and procedures, it is difficult to develop a single multi-state system that both meets their needs and fits smoothly into all the existing

systems. In addition, to accommodate the differences among state procedures and systems, agencies are also commonly asked to compromise their differences.

These compromises often require that agencies revise their existing systems or procedures. These revisions may be fairly simple, such as changing the length of a specific data field in a database, or they may be fairly complex, such as collecting data that had not previously been collected, or changing existing legislation to permit a previously unacceptable activity. The more change that is required of a state to adapt to the common system, the more resistance there is towards accepting that common system.

The multi-state systems that result from these compromises tend to be complex, as they collect all the data required for each state, not just the data needed by a specific state. In addition, despite the higher levels of similarity between states resulting from these compromises, the computer systems that facilitate the interstate cooperation often require "fine tuning" for each state; despite the new similarities, each state still prefers to do some things differently. The increased cost, the decreased confidence that the new multi-state system will work well with a state's current procedures, and frequently, the need to revise existing systems or procedures lead to resistance to system implementation.

Incompatible Equipment

Because each state performs its own equipment procurement and because each state has different sets of priorities, levels of funding, and organizational structures, the equipment state agencies use varies. State agencies often use computers with different proprietary operating systems. At the same time, states may use different brands of equipment at field sites and different methods of communications between the field and central offices.

These differences make the transfer of data between states more difficult than if each agency used similar equipment and followed similar procedures. The differences also mean that simple and obvious solutions to communications problems usually do not

exist, and considerable time and effort are required to select the best method for performing these tasks. The complexity of the communications process slows the decision making and implementation process. If poor decisions are made, system performance and agency acceptance and attitude towards the new system are also badly impacted.

Selecting the "best" communications protocol requires that information system staff from each state agency impacted by the transparent border system have input into the design process. The more agencies that are involved in this process, the larger is the number of people that need to be involved, and the more slowly work is likely to be accomplished.

It is also possible that although the selected system may not be the best alternative for some agencies it may be the best for the group as a whole. Unless that agency's personnel are involved in the decision making process, it will be difficult for them to understand the reasoning behind the selection of a system that is not in their immediate best interest. Consequently, the agency's personnel are likely to be unsatisfied with the selected communications methodology and unenthusiastic about its implementation.

Variation in Policies and Practices

States often have very different perspectives concerning their role in trucking regulation and the role of transparent border technologies. This causes an inter-state conflict similar to the in-state barrier discussed under the heading "Differing Perspectives and Priorities Between Agencies/Groups," above. For example, one state may want transparent border technologies as a means of more effectively monitoring weight distance tax payments, while another state may be primarily interested in performing more effective safety checks. A third state may be interested in reducing paperwork and system complexity.

In addition to differing perspectives, states often differ considerably in the practice of regulatory enforcement. Some states concentrate heavily on the operation of

fixed facilities and operate 24-hour ports of entry. Other states operate no fixed sites and concentrate on roving patrols. These differences in operational philosophy result in different equipment and site characteristics for the state agencies involved. Furthermore, these differences make it difficult to find transparent border technologies and systems that provide benefits that outweigh the costs of system design and implementation for all states.

Lack of Standards

A large number of these barriers exist because there are few standards describing how states should perform specific functions. Minor differences, such as the number of digits provided for a carrier's name in a database, or the coding used to indicate a particular type of infraction, can cause significant difficulties in the design of computer systems required to exchange information.

Major differences also can exist in the computer hardware used to store, manipulate, and transfer the data. Where computer systems differ, states must agree on how to best transfer information. These decisions require considerable discussion among the impacted parties. Often time consuming, these discussions help to develop the most appropriate resolutions to these differences.

CHAPTER 4
ALTERNATIVE TRANSPARENT BORDER SCENARIOS

As noted in the previous chapter, one of the barriers that the project team encountered was that the term "transparent borders" means different things to different groups. Unfortunately, each version of transparent borders has a somewhat different set of barriers associated with it.

Therefore, in order to adequately define the barriers present in each state, the project team has developed a specific implementation scenario. This scenario represents the project team's initial implementation recommendations. While a large number of other implementation strategies exist, this scenario was acceptable to all seven of the participating states. (Note that this is not the optimum scenario for each of the states. The scenario is better described as the highest common denominator for all states.) To provide the broadest examination of implementation barriers possible within the scope of this project, several alternative configurations of the recommended transparent border technologies are also examined at the end of this chapter. State comments on this report will be used to revise the implementation plan as needed.

The selected transparent borders technologies are designed to be implemented in stages, with the initial systems providing the most basic transparent borders functions. As the systems mature and as state agencies learn more about their operational benefits (as well as when more money becomes available), additional functionality and sophistication can be added to the system. The selected systems are designed to be customized so that states can meet their individual needs. Because the final system must reflect the needs and priorities of each, the project team expects variation among the state's actual system implementations.

This chapter introduces the recommended, staged implementation plan. The barriers to implementing each of these steps, both in general and for reasons specific to this state, are then examined in Chapter 5.

RECOMMENDED TRANSPARENT BORDERS TECHNOLOGIES

The recommended transparent border technologies are divided into two sets of staged improvements. In addition, a number of additional refinements to the recommended system are presented. The two recommended sets of improvements could be implemented independently. As the transparent borders systems matured and became more sophisticated, these two paths would converge. These paths are illustrated in Figure 1.

The two implementation recommendations (paths) are designed to work with different areas of interstate truck movements. The first path attempts to reduce the problems associated with states' different size and weight laws. The path starts with and then expands upon the concept of one-stop permit shopping. The second path involves the implementation of electronic credentials verification and automated bypassing of weigh stations through vehicle pre-clearance.

AUTOMATED ONE-STOP PERMIT SHOPPING

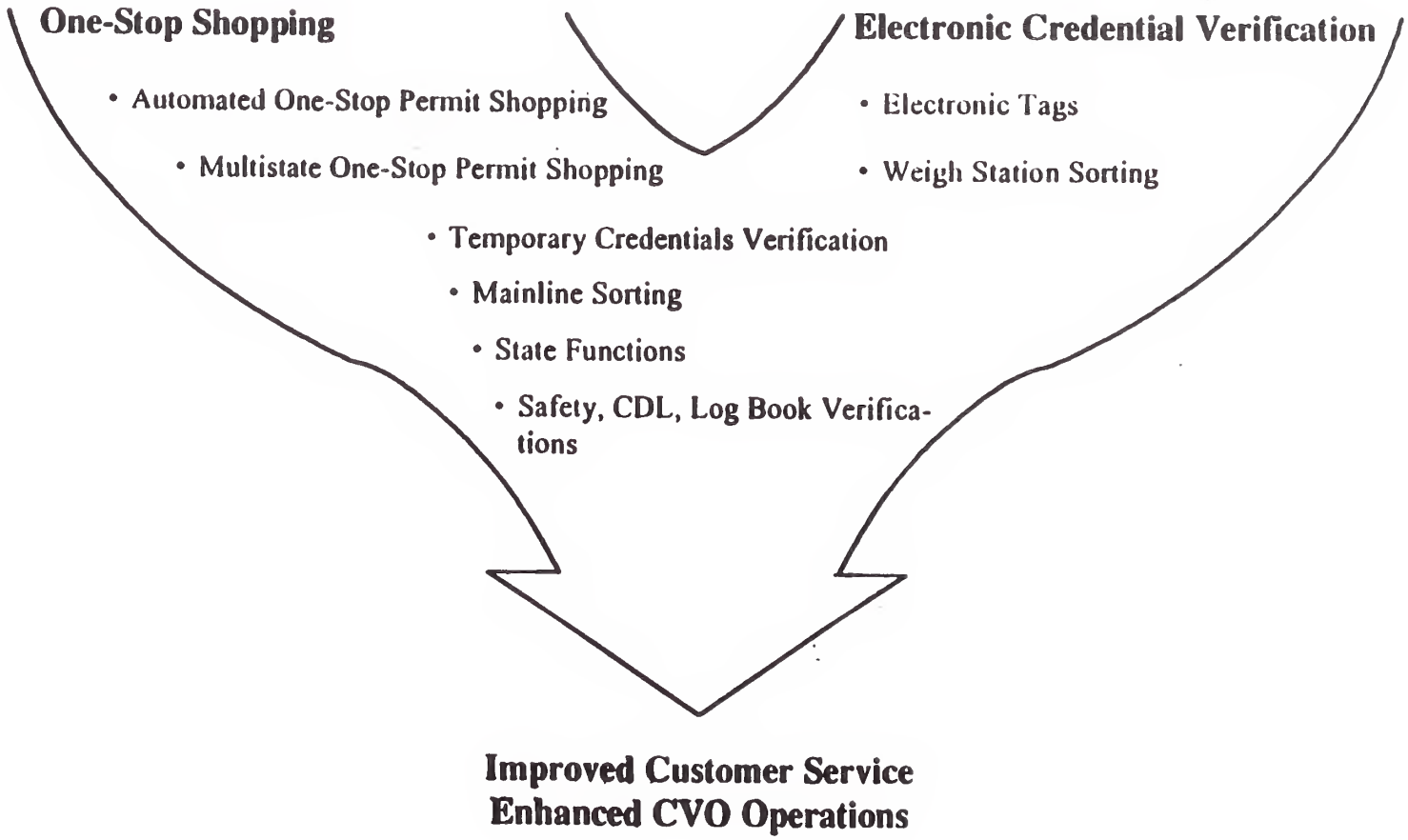
Basic Concept

The basic objective of this implementation path is to improve customer service to the trucking industry by automating the permit process. The basic recommendation is for each state to develop a simple, table-driven computer program that would allow users to determine whether a specified vehicle can legally operate in a state.

The computer program would have to be written so that it would be essentially the same for each state, although each state would change the look-up table information so that it incorporated the appropriate size and weight laws. The user would enter the characteristics of the vehicle being checked (vehicle height, width, length, number of axles and their spacings, load and load distribution, etc.) and the various credentials currently maintained by the carrier of that vehicle.

The computer software would then check the data entries, prompting for additional entries as needed, and indicate whether the vehicle could legally operate in the

Figure 1. Transparent Border System Implementation Paths



state as currently configured and credentialed. If the vehicle was legal, no further action would be required. If the vehicle was not legal, the software would indicate whether the vehicle could be made legal through the purchase of temporary or annual permits, indicate the cost of those permits, and indicate how the permits could be obtained.

Copies of the software could be distributed (at cost) to any vehicle operator that requested them to help them ensure that their vehicles and the loads they were carrying complied with state laws and regulations. (This might not be a significant problem for the larger, more sophisticated companies. However, such a program could be extremely useful to smaller firms or owner-operators new to the industry.)

This computer system could also be used as an aid in determining the need for permits. Permit agents who did not routinely deal with these permits could also benefit from this system, because it could help agents determine which permits were appropriate for different vehicles. This would be particularly useful in states where independent agents (such as county auditors) can write permits, but do not write very many of them.

Participating states could eventually expand the basic software system to actually write permits (or feed information into existing permit writing software). While such a step would not be necessary to provide benefits from the software, expanding the software to write permits would be a logical upgrade.

The one significant limitation to an automated permit system would be the need to maintain routing controls for OS/OW permits. While some sophisticated software programs can perform OS/OW vehicle routing, this function should be left to trained personnel who have access to the necessary bridge, pavement, geometric, and maintenance schedule information. It would not be feasible to perform the majority of OS/OW routing functions on a stand-alone, PC-based software system. For OS/OW routing, the project team recommends that the automated program simply list the appropriate phone number for those persons capable of providing the necessary routing information.

Expanded Concept

If a state was comfortable with the operation of the software, it could expand the concept of a single-stop permitting function to extend across multiple states. Currently, most states in the consortium are able to write multi-state permits under the Western Regional Permit program. Therefore, if a state was comfortable with the operation of the computer programming software described above, there appears to be no reason why a regulatory agency in one state could not use the software to produce permits for another state.

For example, if Washington certified that the permitting software worked accurately, a copy of the software could be given to the state of Idaho. If Idaho also certified that its version of the software worked accurately, Idaho could then use the two programs (presumably working together) to write a permit for an Idaho truck transporting a load from Idaho to Washington. Essentially, this concept extends the Western Regional Permit process to all forms of permits, with the exception of OS/OW permits that need routing information.

The trucking industry would benefit from this capability because it could obtain all of the necessary permits from one location. The industry would also benefit by having a very inexpensive method for checking the legality of its loads and operating status.

States would benefit from this arrangement as well. In the example above, Washington would not have to provide the staff resources necessary to issue the Washington portion of the joint permit. Idaho would benefit by providing better service to the trucking industry at marginal cost. The marginal cost of writing the second permit would be small, particularly if the software was designed to allow transfer of the basic vehicle information from the Idaho permit software to the Washington permit software.

The end result of this computer system would be a multi-state, one-stop permit shop for all permits that do not require OS/OW routing.

Future Enhancements

The final enhancement to the multi-state, one-stop permit software would be to automate the storage and retrieval of the permit information within the states' systems. These issues are discussed as part of the enhanced functions of the electronic credentials verification function, described below.

ELECTRONIC CREDENTIALS VERIFICATION

This section describes a staged implementation process for technological and procedural systems that would allow pre-clearance of commercial vehicles at weigh stations. This pre-clearance function at ports of entry is the most commonly held image of what constitutes "transparent borders for commercial vehicle operations."

The system implementation described below is staged specifically to provide incremental improvements to existing systems. Each of these improvements would provide a specific set of benefits. Groups that would benefit from the improvements would be expected to pay for the enhancements needed to implement the new systems.

The staged implementation would take place in the following steps:

- creation of a regional/national clearinghouse for annual interstate credentials information,
- replacement of annual, on-board credentials with electronic tags and state database information,
- creation of verification systems,
- development of conventional weigh station sorting systems,
- development of mainline sorting systems,
- enhancement of the electronic credential system to include temporary credentials,
- enhancement of the electronic credentials system to include other motor carrier or state agency functions,
- enhancement of the electronic credentials system to include safety, CDL, electronic logbook verification capabilities, and other industry driven enhancements.

The first three steps would have to occur simultaneously in order to achieve the initial operational benefits from the proposed system. Each of these steps is outlined below. (Note that the discussion below focuses on interstate trucking; however, these same systems and procedures could be expanded to incorporate in-state trucking, if a state desired to perform electronic credentials checks for these vehicles as well.)

Regional/National Repository For Annual Interstate Credentials

The first requirement of the electronic credentials verification system would be to provide each state with a usable copy of all the credentials information needed for electronic verification of interstate carriers. All seven states currently maintain IRP databases for vehicles based in their states. However, these data are not transferred in a usable electronic form between states. That is, Washington does not have electronic records for the trucks registered in the IRP by Oregon for travel in Washington, and vice versa.

A number of data exchange models could be used to provide this transfer of information. In the interests of brevity, this section assumes that this function would take place via a regional or national data clearinghouse or data repository. In such a scenario, the states would agree on the information to be exchanged and routinely transfer the data originating in their state to a repository. In turn, the repository would provide the state with the information it needed from the other participating states.

Similar systems would have to be developed for

- IFTA, (note that Oregon would have to first join IFTA)
- the ISTEA mandated, interstate operating authority base state information, and
- base state insurance filings.

States would also have to add vehicle identification information to the IFTA and interstate operating authority carrier records. (Both the IFTA and interstate operating authority databases include the number of vehicles registered by each carrier, but not individual identification codes for those vehicles.) In each case, the basic system design

would be the same. A state oriented database would transfer an agreed upon set of data to a central repository, from where it is then transferred to other participating states.

Data transfers are primarily used to allow electronic verification of credentials, and are intended to contain a limited volume of information. For example, a simple IRP verification file would include identifiers for each tractor, truck, and trailer registered in the IRP (see electronic tags below) and a data flag indicating the status of that vehicle for travel in the state of interest. (That is, a 1/0 flag would indicate whether the vehicle in question had registered for operation in the state.)

To provide for this interstate vehicle verification, all of the consortium states would need to modify their databases to a limited degree. The databases would have to include a common vehicle (and perhaps carrier) identification number and provide the necessary communications capabilities to the central repository. Ideally, the common vehicle ID would be the electronic tag number assigned to each vehicle; however, the vehicle ID could also consist of the vehicle's VIN or license plate number.

Once the main data files had been transferred between states, states would only have to transmit changes (e.g., add these vehicles, delete these vehicles, these vehicles have not paid registration fees) to the database file in the central repository. From there the changes would be transferred to participating states. This approach to the central repository design limits the amount of data that would have to be transferred between states and reduces the scope of the database upkeep process. The use of these data for credentials verification and the steps for keeping the data up to date are discussed below.

Replacement of Annual On-Board Credentials With Electronic Tags

To make use of the electronic credential information described above, states would find it necessary to associate the credentials information with specific vehicles. For the proposed system, this association would be done through the use of a simple (Type 1 or read only) vehicle tag. Although later refinements to the system might include more sophisticated and capable tags, the initial system would use low-cost technology to

reduce the cost of initial system implementation. More sophisticated and capable tags could also be used when the system is first implemented, so long as the cost of the tags is kept to a minimum.

Use of the low-cost tags would mean that the tags would carry only limited information. While this would limit the tag's utility, it would greatly reduce the likelihood of carriers or drivers tampering with or counterfeiting the tags. Because the credentials information would actually be maintained by the state in the database described above, and not on the tag, destruction of the tag would simply cause the vehicle to be stopped for credentials checks as if it did not have a tag. The damaged tag would be discovered, and the credentials would be checked by other means. (The verification system is described in more detail in the following section of this chapter.) Counterfeiting a valid tag would be easily detected by an audit function that checked the likelihood of the tag's geographic location (i.e., a valid tag could not be in two places at the same time). Detection of a counterfeit tag would result in the invalidation of that tag number. A truck carrying that tag number would be stopped the next time it passed a staffed credentials verification location. Counterfeit tags that were not in the state system (i.e., the counterfeit tag did not have the same ID number as a valid tag) would register as invalid in the credentials check, and the truck would be stopped for a more thorough review of the vehicle's credentials.

The electronic vehicle tag would have to be purchased by the trucking firms, although this purchase would be voluntary. One tag would be needed for each tractor or trailer. Tags could not be shared between vehicles. The tag itself would cost a nominal amount ($10 to $50) and would be built directly into the license plate. The license plate would replace the existing apportioned plates, contain a conventional license plate number (like all plates), be printed with the name of the truck's base state, and contain the words "apportioned" and "electronic." The issuing state would also have to provide a single piece of paper to be carried in the cab. The paper would verify that the vehicle

contained valid interstate credentials (IRP, IFTA, etc.) unless otherwise indicated by the credentials verification databases. (This paper is intended to provide the carrier with a valid document to show enforcement officers in case that vehicle must operate in a state or local jurisdiction that did not understand or recognize the electronic tag as a valid credential.)

The nominal tag fee would have to be paid only once and the tag would be warranteed for a given period of time. Broken tags could be replaced for a smaller fee. The revenue generated by the sale of the tags would be used to purchase the tags (license plates) themselves, and could be used to help purchase reader devices to interrogate the tags, and other parts of the system as determined by each state.

In return for purchasing and installing this electronic tag, the carrier would no longer have to replace its primary credentials in the cab (i.e., the credentials issued annually or quarterly) each time those credentials were issued or updated. The permanent cab card would serve as written proof of all these functions, as would the electronic tag. The electronic database would maintain the current status of all the credentials replaced by the tag and database.

By not having to track down each tractor each time its credentials were updated, trucking firms would save measurable staff time and resources. (For a large interstate carrier, the dollar savings from not having to mail or express credentials across the country might equal the cost of the tags within one or two years.) In addition, tagged vehicles would be able to benefit from the functions developed to exploit the presence of the tags.

Carriers that choose not to purchase electronic tags would still be allowed to register their vehicles in the conventional fashion. These vehicles would still be required to carry conventional credentials in their cabs, but they would not be able to benefit from the sorting and pre-screening (or other advances) provided by the electronic vehicle identification system.

Benefits to the state from this system would include

- assistance in the purchase and installation of electronic vehicle tags that could serve multiple purposes,
- a reduction in the paperwork required to register commercial vehicles (Eventually, if all commercial vehicles adopted the electronic tags, the state would be freed from much of the administrative burden associated with printing and distributing vehicle tags, registration cards, fuel tax stickers, fuel tax papers, and other similar credentials.), and
- the ability to electronically check many of the credentials carried by commercial vehicles.

Creation of Verification Systems

The final "leg" of the initial system implementation would be the creation of the systems necessary to check whether the credentials carried by electronically tagged vehicles were valid. The basic verification system would consist of three parts:

- electronic tags on vehicles,
- a computer database that would match each tag with the credentials status of that vehicle, and
- a method for reading the tags.

The physical design and operation of the last two items might differ from state to state, depending on the state's needs and capabilities. For illustrative purposes, a simple version of the verification system is described below. Individual states are likely to create more complex and costly systems in order to provide more functionality to the verification system (e.g., data storage functions, report writing capabilities, interaction with other state databases, etc.)

The vehicle tags described above are assumed to provide only a unique vehicle identifier. This number would also correspond to the license plate number printed on the metal plate. These two numbers would serve as the keys to the credentials verification database. (More sophisticated tags would be acceptable, but they would increase the trucking industry's initial cost of participating in the system.)

The electronic credentials verification database would consist of records for all vehicles equipped with electronic tags and indicate the vehicles' current credentials

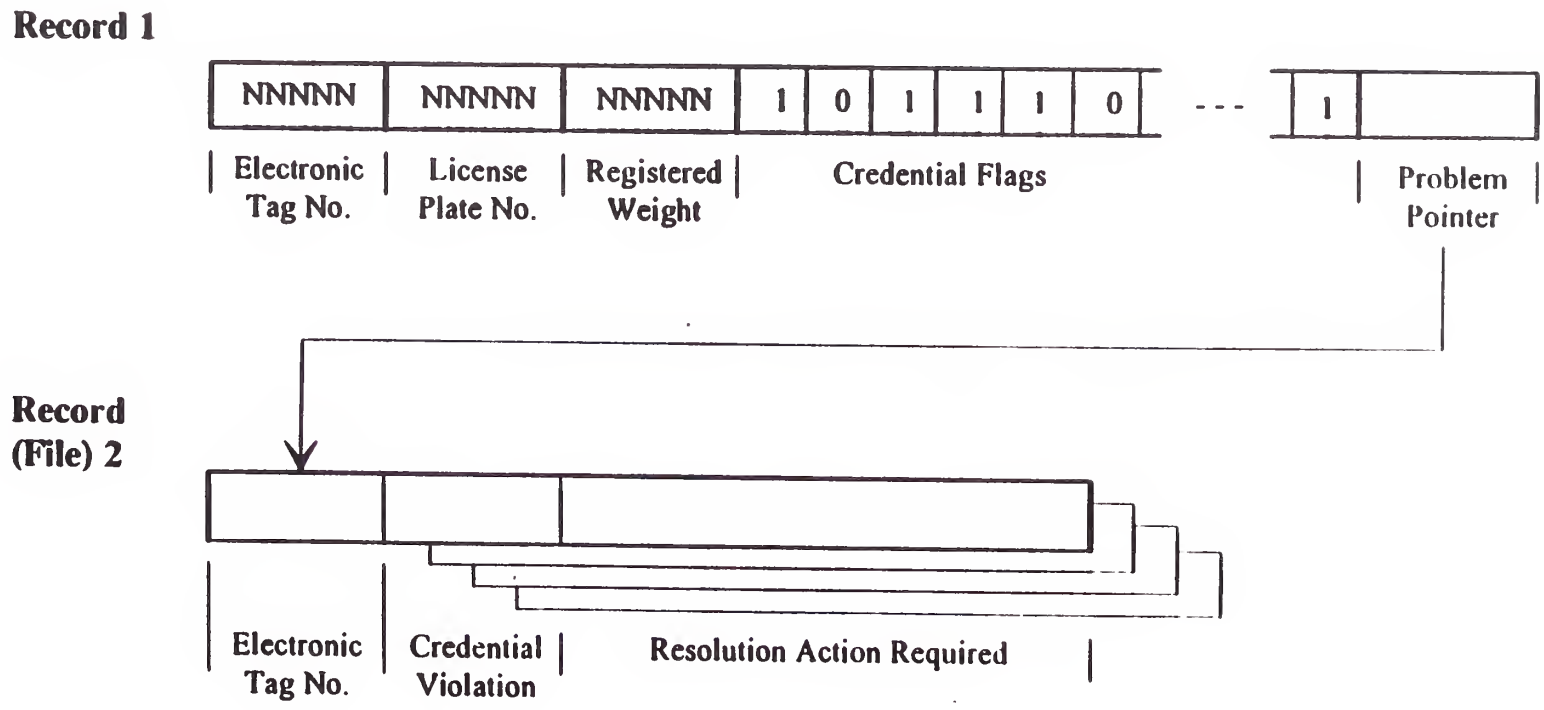
status. The most simple version of this file might include one record for each vehicle. The record would contain the electronic tag number, the license plate number, a flag for each credential (1 = credential is valid for this state, 0 = the credential is not valid), the vehicle's registered weight, and a record pointer. The pointer would direct the computer software to a second record or file that would indicate the specific problem associated with a flagged credentials violation (i.e., how much money is owed and the appropriate action to be taken). This record structure is illustrated in Figure 2.

Data for this file would come from the state databases and the national/regional data repository for IRP, IFTA, and other base state agreements. To create this file, states would have to merge the essential parts of the various state database files. To accomplish this merger, each state would need to use the same vehicle and carrier identification numbers. In addition, the states would need to develop a method for identifying vehicle IDs with specific carrier IDs.

Each state could expand on this basic system as it believes cost effective. Information that the state believed to be appropriate and that was available through the regional clearinghouse or state databases could be added to this system. While this project deals only with interstate truck movements, there is no reason why a state could not expand the vehicle database to include in-state vehicles if the data existed at the state level.

The credentials verification data file in this example would be small enough that it could reside on a conventional laptop computer. (Note that this could change if a state added large amounts of data to their state specific verification system.) This compactness would allow copies of the database to be carried wherever a mobile enforcement officer went. It would also allow the credentials verification system to be loaded onto existing weigh station PC systems, if available in the state. The database could also be stored on a larger computer (mini-computer or mainframe) and accessed remotely via conventional on-line access, if this was more cost effective for the state.

Figure 2. Electronic Credentials Verification Data Records



The system design for the credentials verification database would require that information be available through a search program, with either the license plate number or electronic tag ID as the search key. The search results would be the status of that vehicle. (For example, if the search showed the truck's credentials were valid, a message to that effect would be displayed. If the database search showed that the vehicle was not in compliance or was not in the database, a bell might sound, and the problem would be displayed on the computer screen.)

Access to the credentials verification file should be provided both through manual and automated methods. For the manual look-up, the system operator, who could be a weigh station operator with a laptop computer, would type in the license plate number of the vehicle. In the automated system, an electronic reader (similar to a bar code reader and roughly the cost of a radar gun) would automatically read the electronic plate and transmit the information to the computer. The data entry would trigger the database search for valid credentials.

The credentials verification system would have to be updated periodically. Because only annual or quarterly credentials would be incorporated in the system at this stage of the implementation phase, the updates of the credentials verification system would not have to occur in real time. A daily update would likely be acceptable. (Note that the updates would only involve transfer of the data pertaining to changes to the database, not the transmission of the entire database.) If the time required to update the database was longer than one day, or if the trucking industry desired faster service, a paper temporary permit, good for the number of days required to update the database, could be issued. (The state might also wish to charge a premium for such a service enhancement.)

Because the credentials verification system could fit on a laptop computer, the system could either be located in an existing weigh station or be taken out for roadside use. For automated weigh station operation, a low cost solution would be to simply hang

the reader device in the window of the station. The reader device could then perform credentials checks on arriving vehicles. This system would not provide sorter capabilities; however, the system would allow an enforcement officer operating the scale to automatically check the credentials of the vehicle being weighed.

Summary of First Phase Implementation

The initial system would provide low level benefits to both the trucking industry and state agencies. The trucking industry would gain limited relief from its administrative burden by not having to replace credentials several times each year. The states would gain an automated method for checking the validity of permanent credentials.

The implementation costs for both the trucking industry and the states would be commensurate with the benefits provided at this early stage. The trucking industry's cost to participate would be low (a $10 to $50 one time cost per vehicle). The costs to the state would be equally modest: limited improvements to existing databases and the addition of a number of low-cost microcomputers. Accurate cost estimates for these revisions can not be made without further system definition and a specific study of each state's existing computer hardware and software.

To obtain a higher level of benefits, additional steps and resources would be required. The benefits gained from these additional steps would vary both with various segments of the trucking industry and with different states and state agencies. For states, much of the variability in the system's utility would depend on the current level of credentials verification, the type of equipment the state owned, operated and maintained, and its regulatory work load (i.e., whether the state had a large audit activity or a large evasion or safety problem).

Development of Conventional Weigh Station Sorting Systems

The first improvement that could be added to the initial system would be conventional, medium speed sorter scales at fixed weigh stations. In several of the

participating states, the basic sorter scale facilities (WIM systems, bypass lanes, signing) are already in place. At other sites, modest improvements to existing facilities (adding an AVI reader, connecting the reader to new WIM scales) could result in a fully functioning sorter scale bypass operation that would provide a more effective screening process than is now possible. (In Oregon's case, the Woodburn scale is already operational, and only an increase in the number of tagged vehicles would be necessary to show significant improvements in staff productivity.)

However, in other sites and in some states, the geographic layout of weigh stations would make the addition of conventional weigh station sorting operations an expensive undertaking. (Land would have to be purchased, new bypass lanes would need to be designed and paved, and complete scale/AVI systems would have to be purchased and installed. Depending on the needs and desires of the various state agencies, these kinds of additions might not be appropriate, given the state's current enforcement emphasis.)

Creation of Mainline Sorting System

In states, or at weigh stations, where automated scale bypass functions were desired, but conventional sorter scale operations were too expensive or impractical, mainline bypass systems could also be added to the "basic" electronic vehicle tag and credentials verification systems described above.

As with the conventional sorter scale operation, having electronic tags already on vehicles would allow a implementation of this enhancement, and ensures that enough vehicles could participate in the system that measurable benefits will accrue to the state. Two primary alternatives would exist for each state in the design of mainline sorter operations. In both cases, the state would have to install WIM scales in the mainlines, connect those scales to the credentials verification database discussed above (via the electronic vehicle tag), and communicate with the vehicle driver. Such communications would indicate to the driver whether he/she should bypass or enter the weigh station. The

major difference between the two systems would be the method chosen for communicating with the driver.

The simpler method for mainline sorting would be to provide overhead signs that directed the driver to enter or bypass the scales. Selection of this alternative would provide a system that could be used by tagged vehicles without additional cost to the carrier, un-tagged vehicles would be directed to enter the weigh station to have their credentials checked. The primary disadvantage of this alternative would be the cost of the necessary message signs, and the potential for drivers to misread, misunderstand, or ignore the posted messages.

The second alternative design for mainline screening would be to provide in vehicle messaging to drivers. Given the Type 1 transponder selected for initial system implementation, such a system might be configured as follows.

The state would provide the WIM scale, the AVI reader, the connection between the AVI reader and the credentials verification database, and a broadcast device that would send a message indicating whether the vehicle associated with that AVI tag should proceed or enter the weigh station. To receive this broadcast message, the carrier would need to purchase a reader device assumed to be available in the future from an auto parts store or other retail/wholesale establishment. The device would be configured to respond to messages associated with the electronic vehicle tag attached to the vehicle. The device would contain red and green lights and would be tamper proof (or as close to tamper proof as reasonably possible).

When the roadside WIM/AVI sorter scale system broadcasted a message that a specific AVI device could bypass the scale, the green light on the device would light up. The green light would only illuminate if the vehicle ID in the broadcast message matched the ID associated with the in-vehicle device. At all other times the red light would be lit. If the green light turned on as the vehicle approached the scale, the driver could bypass

the open scale. If the red light remained lit, the truck would need to enter the weigh station.

The project team estimates that this in-vehicle device could be obtained by a carrier at a cost of $30 to $40 per device. Each vehicle the carrier wanted to be able to bypass scales would require one device. The device would be placed inside the vehicle cab, where it would be visible to the driver.

To bypass the scales the vehicle would have to have

- an electronic vehicle tag,
- credentials that were in order,
- weights that were legal (or below some limit set by the operator), and
- the in-vehicle display device.

Carriers without all of these devices would be routed in to the scale for credentials, safety, and driver checks as desired by the operating officer.

(Note that in all sorter scale operations, if traffic volumes were sufficiently light, all vehicles could be brought in to the scale house for driver and safety checks. Enough vehicles would be brought in to the scale house to make maximum use of the available staff resources and to provide a periodic check of vehicles otherwise bypassing scale houses because their credentials were in order. These checks would also verify that these vehicles were not operating unsafely because they were less likely to be examined at the scale house.)

Temporary Credentials Enhancement

The next logical enhancement to the electronic credentials verification system would be the addition of credentials that were issued more frequently than the annually/quarterly distributed credentials incorporated into the base system described above. These short term credentials were primarily made up of trip permits.

In many ways this process would be no different than the electronic credentials process described above. The primary difference would be the processing speed required from the system. For annual credentials, the research team assumed that some lead time (perhaps as much as one or two days) would be available between the entry of a valid

credential at the initiating state level and the availability of that information in another state's credentials verification database. This lead time would give the originating state time to enter the data, transmit the data to the central repository, have the central repository merge the new data into the central file, and then download the data to the participating states. Finally, it would allow time for the remote locations, and/or portable computer users, to download the data from their state computer.

For short duration permits (i.e., trip permits), the time frame between the purchase of the permit and the use of the permit might be much shorter than the processing time described above. Therefore, the vehicle using the permit could reach a credentials verification point (having already purchased a permit) before the data did indicating that the vehicle was operating legally. Without a written permit, assuming that the permit was replaced by the electronic tag, the carrier would be stopped and cited for lack of proper credentials.

Thus, for short-term (temporary) permits to be included as part of the electronic tag described above, states would have to improve their communications systems so that database updates could occur quickly. Information about permits issued by a state would have to be available to personnel in the field almost immediately. This ability would involve a substantial upgrade of the computer systems, computer communication systems, and field computer equipment. On the other hand, states that already had substantial computer communications capabilities in place would be able to add these capabilities without additional communication system upgrades.

Even with improved communications capabilities, the credentials verification system (as enhanced) would not be able to incorporate all temporary permits. As noted earlier, some OS/OW permits are limited to specific routes or geographic locations. To ensure that the vehicle driver understands these limitations, the permit issued by the states includes a description of the routes that can be used to move that load. Replacing this paper with the simple electronic tag and a complex database entry for credentials

verification would be possible; however, such a replacement would not provide the driver with the necessary written information to move the load. Additional enhancements to the electronics present in the cab must be completed (e.g., replacing the Type 1 tag with a complete onboard computer and display) before OS/OW permitting with routing can be performed electronically.

Addition of Other Motor Carrier Or State Agency Functions

The next addition to the credentials verification system would depend on the needs of the participating states and motor carriers. Because the regulatory environment is different in each state, each state maintains a number of different databases and operating procedures. For example, Oregon collects, stores, and uses considerably more information than do the other six states in the consortium. Similarly, the needs of the various motor carrier groups differ; and what is wanted by one group may be fiercely resisted by others.

The basic credentials verification system would have to be flexibly designed so that it could be expanded to meet specific state and motor carrier industry needs, which might vary considerably from state to state. For example, a state could expand the electronic credentials system to include all intrastate and interstate carriers. Similarly, specific motor carriers might be willing to fund additional system reporting capabilities. Such capabilities could enable them to obtain information that would allow them to operate their fleets more effectively.

To accomplish an expansion to intrastate operations, the state would have to allow intrastate carriers to use the electronic vehicle tag/credentials system (i.e., purchase and use the electronic tag in lieu of the current paper credentials system), provide the software enhancements needed to add intrastate carrier information to the credentials verification database described previously, and install readers at additional locations as intrastate trucks often do not pass through locations effective for screening interstate trucks. For most states, these additions would not be complex, since many of the data needed for

interstate credentials verification are very similar to the data needed for intrastate credentials verification.

Intrastate carrier data would not need to be shared with other states and would not need to be transferred to and from the national/regional data repository. Instead, intrastate motor carrier data might be transferred directly from the existing state databases to the credentials verification database.

A state like Nevada might choose to add its Public Service Commission (NPSC) database to the credentials verification database. The NPSC file includes different types of information than are currently included in the basic credentials verification system (e.g., operating authority and insurance status for intrastate carriers.) Thus, for Nevada, the credentials verification system would need to be expanded to include not only additional vehicles and carriers, but other types of information as well. Such an addition would not be difficult, as the verification function for these credentials would not be significantly different from the vehicle registration, fuel tax, and interstate operating authority functions included in the base system. (That is, it would check that the vehicle either had a credential or did not have the credential.) For intrastate operating authority in Nevada, the basic verification system would need to be enhanced to indicate the counties the carrier had authority to operate in and the commodities the carrier was permitted to transport.

Any number of other state-specific capabilities could be added by any state to customize the basic credentials verification process, provided the data were readily available, could be tied to specific vehicles, and could be uploaded to the credentials verification database for that state in a timely fashion. The upkeep of these state specific additions would be the responsibility of the implementing state, and this data would not be shared across state borders, unless a neighboring state chose to adopt those same enhancements.

Addition of New Safety, CDL, or Electronic Log Book Verification

The final set of enhancements would include the addition of new safety, CDL, or electronic logbook verification functions. These enhancements could not be added to the system until additional on-board vehicle devices have been developed, and new infrastructure installed along the highway to communicate with those devices. For example, most states are interested in performing more thorough inspections of drivers licenses (i.e., is the driver licensed to operate that vehicle, is the driver operating under the influence of controlled substances, or is the driver exceeding his/her legal hours of service?). This information would not be supplied by the basic credentials verification system, although some potential exists for using vehicle ID, location, and time of passage as a means of screening out some vehicles that might have drivers who had exceeded their legal hours.

Some fleet vehicles are already storing driver identification and hours of service information in on-board computers, and it may be possible to transmit this information to the roadside. However, it is unlikely that such a system could be widely distributed in the near future because of the cost of installing this equipment and the sensitivity of that information. Nevertheless, the basic credentials verification system could be expanded at a later date to include this type of information if the information was transmitted to the roadside from a passing vehicle. (Vehicles transmitting this information would then be allowed to bypass drivers license checks, while non-instrumented vehicles would be stopped for these checks.)

Another topic of significant interest involves the condition of the vehicle. Although they lack the resources, all states in the consortium would like to more efficiently identify unsafe vehicles, so that they can either pull them out of service or require their drivers/owners to improve their condition. At this time, the difficulty is that no electronic systems exist that can automatically identify whether a vehicle is safe to operate, let alone transmit that information to an observer or electronic device. Trained

personnel must make this determination, which is possible only after they have stopped and inspected a vehicle. If a device were developed that could monitor vehicle or critical vehicle system performance and transmit the status of those critical systems to a roadside reader, existing staff could more efficiently identify, stop, and check vehicles that were unsafe.

Decisions to develop and add these types of enhancements would be made at both the state and federal level as interests in these functions increased, and as research provided cost-effective methodologies to perform them. It is likely that these higher level enhancements would require additional transmission capability from the vehicle to the roadside and perhaps from the roadside to the vehicle. While the basic credentials verification system would have only limited data transfer capability, the addition of this transmission capability later in the development of the system should not be too difficult, as the in-vehicle components would inevitably mature.

As with the simplest level of the credentials verification system, the on-board safety devices would be implemented only when the benefits available to specific groups become great enough that they become willing to pay for the necessary system enhancements. Transmission of driver and vehicle safety status information from the vehicle to the roadside will also meet implementation resistance from the trucking industry if those fleets that participate in the transmission of that information believe that they are being subjected to an increased level of inspection that is not being applied to non-participating trucking firms. At this time it is only necessary to understand that the credentials verification system would need to be modified in the future to include these more powerful data transfers. Thus the system should be designed to be sufficiently flexible and modular to allow the eventual addition of these diverse and incompletely defined systems. Designing this flexibility may result in a higher initial cost for system design and implementation, but should result in substantial savings in the future as the system's capabilities are enhanced.

CHAPTER 5
BARRIERS TO SYSTEM IMPLEMENTATION

As part of the transparent border credential verification system described previously, eight transparent border "systems" have been identified. These systems are not intended to stand alone but to overlap and build upon each other. However, for the sake of discussion, the systems will be addressed separately. The eight systems are as follows:

- an automated, one-stop permit system,
- a regional/national clearinghouse for annual credentials,
- electronic tags,
- weigh station sorting systems,
- mainline sorting systems,
- temporary credentials enhancement to the clearinghouse,
- the addition of other state functions to clearinghouse, and
- safety, CDL, or log book verification systems.

Each of these systems has requirements and barriers that could potentially prevent, its implementation. Areas that could be impacted by the implementation of these technologies include the following:

- agency responsibility or procedure,
- budget management,
- personnel training or acquisition,
- data collection or transfer procedures,
- equipment acquisition or enhancement,
- technology development, and
- legislation, rules or agreements.

A summary of the most significant potential barriers to implementation of the transparent borders systems is given in Table 1. More specific discussions of the requirements and potential barriers for each of the proposed systems and for each of the impacted areas are provided below. Important barriers to be overcome are highlighted in italics.

AUTOMATED PERMIT SYSTEM

The automated permit system would consist of a simple, table-driven computer program containing permit information for a specific state. The program would allow a

Table 1. Significant Implementation Barriers in Montana

System	Barriers
Automated, one-stop permit system	• Obtaining interagency and interstate agreement to implement this system • Agency reluctance to share/give up responsibility for the permitting task • Obtaining funding for multi-state, multi-agency system • Different levels of automation among the states pose system design problems • Use of different (or no) computer equipment for issuing permits among states poses design problems • Lack of technical capability and funding necessary for outside technical assistance may slow the software development • Because Montana already has (or soon will have) permit writing software, it may be less interested in this system which duplicates some existing functions
Central repository for annual credentials	• States must be convinced that the benefits of regional data sharing outweighed the cost of system development and operation • Participating states must agree on the data to be maintained within the repository • Different levels of automation among the states could result in a lengthy system implementation process • Without assurances of data privacy, the trucking industry will probably oppose system implementation • Vocal opposition by the trucking industry would significantly retard system implementation
Electronic tags	• Persuading the trucking community to place electronic tags on vehicles • Convincing state agencies to replace (not supplement) existing paper credentials with the electronic credential • Selection of standards for the tag and reader system • Substitution of electronic tags for paper credentials might be met with substantial resistance from regulatory and enforcement agencies, and from the trucking industry

Table 1. Significant Implementation Barriers in Montana (continued)

System	Barriers
Electronic tags (continued)	• Using the money supplied by tag sales for operational expenses may require legislative action to raise the MDT spending ceiling to account for these funds • The "up front" cost of the electronic tags and readers poses a financial barrier • Delays often occur when developing formal agreements between states and/or agencies
Weigh station sorting systems	• Enforcement personnel might be resistant to changes in field operations that allow maximum use of the WIM system as a result of concerns over safety issues • Contradictory perspectives among the regulatory/enforcement agencies and the trucking industry might slow the implementation process.
Mainline sorting systems	• Enforcement personnel might be resistant to changes in field operations that allow use of mainline WIM systems as a result of concerns over safety issues
Temporary credentials enhancement	• Significant technological and cost barriers must be overcome to implement these enhancements • Changes in legislation might be required to alter security levels for some information
Safety, CDL and log book additions	• Affordable technology does not exist to electronically detect safety problems on commercial vehicles • Trucking firms may fear unfair selection of their vehicles for inspections or citations • Substantial technology development is required prior to system design and implementation; considerable testing is required to overcome expected field personnel concerns • The high cost of these enhancements are barriers to this system enhancement • Different levels of automation among the states may slow implementation • Contradictory perspectives among the regulatory and enforcement agencies, the vehicle manufacturers, and the trucking industry on what the objectives of these systems should be, and who should pay for them might significantly impede system implementation • Regulatory limitations protecting access to CDL and logbook information might be a significant barrier to implementation

user to determine whether a specified vehicle could legally operate in that state. Ideally, this program could not only check the validity of a truck's credentials, but could also produce the permits necessary to make a load legal (if that was possible), thus creating a "one-stop shop" for permits. If states shared their permit software, each state could issue permits for neighboring states. Thus, truckers traveling through multiple states could stop at one location and receive the permits required in each of the states they were passing through. The need for oversize/overweight permits (or other permits requiring state controlled routing) would be identified through the computer program, but the permits themselves would not be issued, as state controlled routing would be required.

The automated permit system, in its multi-state form, would predictably (1) reduce the amount of paperwork handled by each state, (2) improve compliance by simplifying the permit process for the trucking industry, and (3) free up regulatory and enforcement personnel for other tasks.

The areas of operation that would be affected by the impacts of the automated permit system are discussed below.

Agency Responsibility or Procedure

To ensure that permits would be issued accurately, someone would have to be responsible for updating the permit information contained in the software. Changes in length, width, height or weight (axle or gross) limits as well as changes in permit fees and issue locations would have to be kept updated. In Montana, it has been suggested that the responsibility for each of the above tasks should lie with the Montana Department of Transportation, Motor Carrier Services Division (MDT, MCS).

The automated permit system would be most beneficial if all permits could be obtained through a single location. Most of the permits in Montana are already issued by the MDT. Exceptions include temporary operating authority and hazardous waste permits. These permits are administered respectively by the Montana Public Service Commission (MPSC) and the Montana Department of Health and Environmental

Services (MDHES). Hence, the MDT would also need to assume responsibility for issuing these permits, which may require legislative approval.

Rather than having the MDT assume responsibility for all permits issued in the state of Montana, another alternative might be to cross-train staff from each of the agencies involved in the permitting process, including the MPSC and the MDHES. This would allow a representative from any of the regulatory agencies to issue the permits required by a carrier and either answer questions or direct questions to an appropriate person. In Montana, this may not make as much sense as in some other states, because the MDT issues the vast majority of permits, and it may be too burdensome for the other agencies to take on such responsibility.

Obtaining agreement to perform automated, one-stop permitting would likely be the biggest barrier to the system's implementation. If the reluctance to turn over permitting responsibilities was too strong, the MDT could provide the MPSC and the MDHES with contact numbers and permit information through the automated permit system, but leave the actual permit issuance to the respective agencies. While this would solve part of the problem, it would eliminate much of the benefit from the automated, one-stop permit system.

Each of the implementation requirements discussed above needs to be addressed for each of the participating states. *The success of the multi-state permit system would depend not only on Montana's ability to issue all permits from a single location, but on Montana's ability to issue permits for other states and other states' abilities to issue Montana's permits.*

With such a variety of agencies involved in the permitting process, substantial barriers might arise because of agencies' reluctance to give up responsibility for the permitting task. In Montana alone, agencies capable of issuing permits include the Montana Department of Transportation, the Montana Public Service Commission, and the Montana Department of Health and Environmental Services. Additionally, a number

of permit agents are contracted to issue permits. The MPSC and the MDHES might be reluctant to let the MDT issue operating authority and hazardous waste permits because of the MDT's lack of regulatory background in these areas. This reluctance might increase if Montana allowed another state's regulatory agency to issue Montana permits. Relieving this reluctance might only be possible by demonstrating that the software developed for the system would work accurately with little or no continuing input from MPSC and MDHES staff.

Staff resistance to the automated permit system should be minimal in Montana. Montana is currently issuing the Western Regional Permit, which is similar in theory to the automated permit system being proposed (i.e., the state of Montana is assuming the responsibility for issuing another state's permit).

Budget Management

No change in revenue is expected as a result of the implementation of the automated permit system. This implementation would likely be looked upon favorably by Montana regulatory agencies, who seek revenue neutral programs. If the MDT assumed responsibility for issuing the operating authority and hazardous waste permits, the revenue generated by their issuance would still be available to the MPSC and the MDHES in the same manner it is currently.

Funding required to implement the automated permit system would be relatively minimal and should not act as a barrier to system implementation if the automated permit project was a priority with the MDT. However, *funding multi-agency systems that are not high priority items for all agencies is often a time consuming process.* This barrier would be minimized if Montana's existing computer equipment could operate the automated permit software program, because funding would only be required to develop the software and to integrate it with the existing permit writing software. This is likely to be the case (see Equipment Acquisition below for more details.)

Personnel Training or Acquisition

As with any new computer system, some time would be required initially for the staff to become familiar with using the program. This time should be minimal because the permit program itself would be very simplistic. If the permit system were made available to the trucking industry, staff time might be required to help trucking industry personnel use the software. However, fees could be charged to offset the cost of this training.

While some staff will be resistant to change, Montana personnel should have no trouble adjusting to the automated permit system because their existing permit system is, or soon will be, highly automated.

Data Collection or Transfer Procedures

The implementation of the multi-state permit system would require that information, such as changes to permit requirements, be shared in electronic form between the states. As a result, *different levels of automation among the states might pose some implementation problems and delay the initial system*, as neighboring states obtained the equipment and expertise necessary to operate the software.

Equipment Acquisition or Enhancement

The equipment needed to operate the proposed automated permit software system would include the following hardware: (1) computer(s) on which to operate the software and (2) printer(s) to print the permits directly from the input screen of the software program. From previous discussions with MDT personnel, it is anticipated that all weigh stations will be computerized in the very near future (if not already complete). The Helena MDT headquarters office is already automated, and automation of all other MDT offices is planned, but no implementation date has been established. It is expected that this automation effort will be sufficient to support the proposed automated permit system.

One possible barrier would involve the fact that different states use different (or no) computer equipment for issuing permits. Thus, a single software program may not

operate on all states' computers, without substantial revision. This incompatibility might either complicate the software development and update procedures, or force states to change computer types. Both of these consequences would result in an increased cost for system development and an increased resistance to system implementation.

Technology Development

Because a comprehensive, universal software package does not currently exist for state permits, someone within each state or an outside party would have to develop the software. In some states, such as Montana, it might be necessary to integrate this software with existing permit writing software. Once the permit software had been developed within Montana, links would have to be created to share permit information among the states.

Potentially, *the development of the software and the links among the various states might be slowed because of a lack of technical capability and the funds necessary for outside technical assistance*. However, Montana should be able to develop the system in-house as highly technical staff are available. Montana's decision to either build the system in-house or through an outside vendor should be made by Montana information systems staff in conjunction with the needs/desires of the participating states. *Barriers to implementing this system are also present in Montana because the state already has (or soon will have) permit writing software*, and thus benefits from this effort would only be obtained as a result of the multi-state use of the software.

Legislation, Rule or Agreement

In order to ensure multiple states participation, formal agreements might be required. One potential barrier to developing a formal agreement for the implementation of an automated permit software system would involve the different perspectives among the different states' regulatory agencies.

Finally, the development and signing of multi-state agreements to share responsibilities, software, and funds would also take considerable time and effort to

implement. Montana should expect the agreement process to take at least as long as the software development process to implement.

CENTRAL REPOSITORY FOR ANNUAL INTERSTATE CREDENTIALS

A central repository, established on a regional or national level, would provide better information to Montana on carriers based outside the state. This information would consist, at a minimum, of vehicle information, carrier information, and credential status. Initially, the information would relate to annual or permanent credentials such as IRP registration, IFTA status, special fuel licenses, and operating authority. Information regarding these credentials would be provided through a series of data exchanges.

Central databases would be needed both within Montana, for use by Montana agencies, (primarily MDT-MCS and Montana Highway Patrol enforcement officers), and regionally (or nationally) in order to transfer information among the states.

Agency Responsibility or Procedure

The creation of a central repository would help to ensure that the database used for credential verification was always updated. To keep the system functioning properly, Montana staff would have to ensure that changes in the existing credential status be entered into the database promptly.

The Montana Department of Transportation Administration Division, which maintains control of the MDT mainframe computer, should be involved in establishing the repository. It would be necessary to have close cooperation with the Montana Department of Justice (MDOJ), which also maintains significant CVO information on another mainframe computer. . However, each agency affected by the system would have to actively participate in the system design and development. The potential for a barrier exists here because the resources required to keep this system updated might not be available within some agencies. In addition, these regulatory agencies might not perceive this updating function to be as important as other resource needs. This perception does not appear to be a significant problem within Montana.

Often, agencies do not want the added responsibility of a new program; the resistance to change can be very great. However, the MDT and MDOJ are interested in the advantages to be gained from the central repository and electronic credentials verification system, and should not be adverse to taking on these responsibilities.

Budget Management

Funding for the central repository should be obtained either through the U.S. DOT or through a pooled fund project with the other participating states. After the regional repository was developed, each of the states or agencies might have to contribute a monthly, quarterly, or annual repository maintenance fee to ensure that the staff, equipment, and operation were serving the needs of the states. Similar situations currently exist for the IRP and IFTA repositories. *Finding funds for this repository would become a barrier if states did not believe that the benefits of regional data sharing outweighed the cost of system development and operation.*

Personnel Training or Acquisition

Regulatory staff would need to be trained in uploading and downloading information from the central database, both at the administrative level of changing a carrier's credentials status, and at the enforcement level where credentials are actively verified. This update function might require either additional staff or computer resources from the participating agencies; however these additional resources should be marginal. The staffs' workload might also increase because of an increased number of questions from other states regarding a carrier who is stopped for possible violation. This increase in questions should be offset by the increased revenue collected as a result of better credentials verification capabilities. Personnel issues are not seen as major barriers to system implementation.

Data Collection or Transfer Procedures

The implementation of a regional/national data repository would require some states to automate their data collection processes. Montana already collects and stores a

substantial number of data electronically via a mainframe system. However, Montana might be required to compile additional information that it is not currently collecting to be consistent with other states. This would, however, greatly increase the workload of existing staff and might even require additional personnel. If this happened, it would result in increased resistance to this project.

The creation of the database at the central repository, and the changes that would be necessary at the state level to support this repository, could become significant barriers if participating states could not agree on the data to be maintained within the clearinghouse, or if the data to be maintained centrally were not already available within some states.

For the central repository to be beneficial to all participating states, common identification schemes would be needed for (1) vehicles, (2) carriers, and (3) the link between vehicles and carriers (i.e., tracking which vehicles belonged to which carriers). The development of these identification systems might require substantial effort initially to provide for the collection, storage, and retrieval of these identifiers. While agreement between the participating states on these items may take some time, reaching agreement on these items is not seen as a major barrier to system implementation.

Different levels of automation among the states could result in a lengthy system implementation time for the less automated states and frustration for the more automated states. These implementation times could be shortened if the data transfer process was correctly selected to minimize the expense of system interaction, while continuing to provide for the greatest level of flexibility in computer to computer communications.

To protect the privacy of the trucking industry, the central repository's design will have to allow agency's access only to information necessary to achieve regulation and enforcement. *Without assurances of data privacy, the trucking industry will become a major barrier to system implementation.*

Equipment Acquisition or Enhancement

The amount of equipment that would be required to implement the annual credential clearinghouse system would be dependent upon a state's current level of automation. For some of the less automated states, the cost of the equipment might serve as a barrier to implementation. In Montana, much of the equipment is already available or is intended to be acquired in the near future; equipment acquisition should not be a substantial barrier to implementation of the repository.

Technology Development

To develop a regional/national repository, data exchange models would need to be developed to allow data in electronic form to be easily transferred among, or accessed by, the various states. A number of models already exist to facilitate this process, including the CDL database. The different levels of automation among the states make the development of the data exchange models technically challenging. However, while the selection of the appropriate communications process may take longer than desired, it should not be a significant barrier to system implementation.

Legislation, Rule or Agreement

Formal agreements or even a change in legislation or administrative rule may be required to (1) develop a repository, (2) allow information sharing among the states, and (3) change the level of security on some of the information maintained in current databases.

Contradictory perspectives among the regulatory agencies and the trucking industry in various states might inhibit the development of the regional/national clearinghouse. *Vocal disagreement with the implementation plan by the trucking industry would significantly retard system implementation. This is likely only if the system is made mandatory, or if the regulatory agencies are not willing to provide assurances that the system will not be used to hurt the competitive business position of the participating trucking firms.*

REPLACEMENT OF ANNUAL CREDENTIALS WITH ELECTRONIC TAGS

Electronic tags on trucks containing a unique vehicle identification number would provide information directly to the port of entry if the vehicle identification number were tied to the central repository. Initially, only information regarding annual credentials would be provided; this credentials information would be based on the truck's unique identification number.

For those circumstances in which the electronic tag was malfunctioning or was not recognized as a valid credential, a secondary credential would have to be available. A single paper credential has been proposed that would be carried in the cab of the vehicle at all times and that would provide information regarding the status of all annual credentials.

Persuading the trucking community to place electronic tags on its vehicles would be one of the primary barriers to IVHS CVO system implementation. The trucking community would have to be offered benefits that equal or exceed the cost of the electronics it was being asked to place on its vehicles; otherwise the tags would not be placed on the vehicles, and the benefits would not be realized by either the trucking community or the states. *A second major barrier to system implementation would involve convincing state agencies to replace (not supplement) their existing paper credentials with the electronic credential.* If the existing credential were still required, many of the "hard" financial benefits provided by the electronic credential would not be available to the trucking industry, which would limit the number of carriers participating in the system.

Agency Responsibility or Procedure

Currently, the annual credentials (IRP, IFTA, special fuel license and operating authority) are issued by several different agencies or sub-agencies. The proposed single credential would blur this area of responsibility. However, once the electronic credential system had been installed, each agency would continue to perform the regulatory function

that it normally fulfilled. During the system implementation, additional interagency communication would be necessary to ensure that the IDs associated with each vehicle were identical in the different state databases, and that all of a vehicle's credentials were valid when the electronic tag and single piece of paper were first issued.

In addition to issuing the in-cab credential, the agency responsible for the electronic tags would have to order and purchase them from the vendor as well as distribute them to the trucking industry. The MDT-MCS, which is currently responsible for issuing interstate commercial registration through the IRP, would be a good candidate to undertake this responsibility. The MDT would have to work closely with the Montana Department of Justice Motor Vehicle Division (MDOJ-MVD), which currently has responsibility for registration of intrastate vehicles, and issuance of license plates. Both the MDT or MDOJ should provide political support to ensure that the electronic license plate is accepted by the Montana legislature. *A major barrier to this step would be the selection of standards under which the tag was purchased.* The FHWA's support in selecting the tags for system use would help this step substantially.

If a problem arose with one of the tags (the tag was damaged or was malfunctioning), the issuing agency would have to replace it. Because most problems with electronic tags would be noted at the ports of entry (POEs) which are operated by the MDT, the POE staff would have to remain in close communication with the MDT issuing office(s). It would even be beneficial (although not necessary) if MDT POE staff could issue replacement tags to vehicles carrying valid Montana credentials, but whose tags were malfunctioning.

The substitution of electronic tags for hard copy credentials might be met with substantial resistance from both regulatory and enforcement agencies, and from the trucking industry. Agencies fear that their regulatory and enforcement powers would diminish because of the need to base their actions on electronics that might not be accurate or reliable. The trucking industry has similar fears. Carriers and drivers

anticipate being falsely accused of lacking credentials and having to rely on electronics for verification. While previous tests have indicated the reliability of the tag technology, these fears might still pose some barriers.

This problem of tag and reader reliability should not be substantial in Montana. A good working relationship exists between the Montana regulatory agencies and the trucking industry. However, Montana would need to develop robust contingency plans for instances when tags and/or readers failed, or when truckers believed they had valid credentials, but the database indicated they were invalid.

Budget Management

To implement the replacement of on-board credentials with electronic tags, substantial initial capital would be required. Funds would be needed to: (1) purchase tags from the vendor, (2) purchase and install the tag reader systems, (3) equip weigh stations and ports of entry with computers to synthesize the information from the tag and the clearinghouse, and (4) train staff on the new procedures.

Additional funding might be required to improve information access among agencies previously responsible for issuing the annual or permanent credentials and the new agency responsible for issuing the single, on-board credential. The MDT would most likely fund the communication improvement efforts, as it would benefit the most from the system's implementation. However, each agency might be responsible for the cost of minor improvements to its existing information systems.

Assuming the tags would be purchased by the trucking industry for a nominal fee, plans would be needed to disburse the revenue generated by the sale of the tags. This money should be circulated back into the electronic tag system for operational expenses, including the actual cost of the tags. *Using the money supplied by tag sales for operational expenses may require legislative action to raise the MDT spending ceiling to account for these funds.*

The initial investment in electronic tags and readers might pose a barrier to the implementation of the electronic tag system in a number of states. Montana is no exception, though there are strong proponents from both the trucking industry and the regulatory agencies that believe high technology systems would greatly benefit commercial vehicle operations.

Personnel Training or Acquisition

Training efforts might be required not only for the operation of the automated electronic tag and clearinghouse system, but also for the manual data retrieval aspects of the verification system (i.e., if a truck should come through with a missing or malfunctioning tag.) Personnel training should not be a significant barrier.

Data Collection or Transfer Procedures

The agency responsible for issuing the single, on-board credential, (most likely the MDT-MCS), needs access to either (1) each of the agencies responsible for the individual annual credentials or (2) the information needed to issue each of the annual credentials. While the method for providing better information linkages between the credential issuing agencies and the MDT will require effort to solve, they should not be significant barriers to system implementation.

Equipment Acquisition or Enhancement

The equipment required for the implementation of the electronic tag system would include (1) tags to be distributed to the trucking industry, (2) tag reading equipment to be installed at weigh stations and ports of entry, (3) computers to synthesize information from the electronic tag and information in the clearinghouse, and (4) possibly, transportable tag readers to be used when a truck was stopped away from a port of entry or weigh station.

Technology Development

Because several varieties of tags currently exist, little effort would be required for the technological development of electronic tags. The challenge would come from trying to reach a consensus on the type of electronic tag to employ.

Legislation, Rule or Agreement

To fully implement the electronic tag system, formal agreements among the states, or even a change in legislation or rule, might be required to

- reach a consensus on the best type of tag to purchase and employ,
- allow a single document in the cab to represent all the individual credentials (i.e., IRP, IFTA, special fuel license and operating authority),
- allow a piece of paper to be replaced by the electronic tag and database system, and
- assure the trucking industry that the electronic tag technology would not be used as a means of speed enforcement or for purposes other than originally intended.

These *formal agreements or legislative changes may be slow in developing due to contradictory perspectives among: (1) regulatory and enforcement agencies, (2) state agencies and the trucking industry and (3) different states.*

Additionally, regulatory limitations, such as existing statutes, might slow the development of agreements or changes. Although agreement should be easily reached among Montana's regulatory agencies, the process might be slowed when Montana works with other states and the trucking industry.

CONVENTIONAL WEIGH STATION SORTING SYSTEMS

Weigh station sorting systems would consist of weigh-in-motion (WIM) technologies, bypass lanes, and signing. Weigh-in-motion technology would enable the port of entry officials to determine whether a truck was of legal weight without making the truck stop on static scales to be weighed. If the truck was legal, the driver would be able to continue through the port. If a truck was not legal or was close to being illegal, the driver might be asked to stop at the port and be weighed on the more accurate static

scales. This technology should be tied in with the regional/national repository so that credentials could be checked at the same time the truck was being weighed.

Agency Responsibility or Procedure

The implementation of a weigh-in-motion system would require agencies currently responsible for safety regulation through vehicle inspection to develop a new method of truck selection (perhaps random). Currently, when a truck comes into the port of entry to be weighed, the condition of the vehicle, the driver and the load is observed as the truck rolls slowly through the scales. On the basis of this observation, trucks are asked to pull over for inspection.

Weigh-in-motion technology would allow trucks to travel through the ports of entry at a substantially higher speed, making it more difficult to observe the vehicle, the driver, and the load.

Implementation of WIM systems might compromise the drive-by safety evaluation process. Enforcement agencies may be resistant to changes in field operations that allow maximum use of the WIM system.

Budget Management

To implement a weigh-in-motion system, funds would need to be set aside for (1) the purchase of additional land for bypass lanes, (2) the construction of the bypass lanes, (3) the purchase of the equipment, and (4) the installation of the equipment. Equipment would include not only the scales themselves but also computers for the weigh facilities and overhead signing.

The costs of WIM implementation are variable and depend on the state's current level of automation. Because Montana is large and sparsely populated, the high initial cost of the system might be difficult to justify for some of the more remote locations; the benefits of WIM, which are most apparent in congested areas, may not outweigh these costs. In more populous states the availability of land for construction of bypass lanes can be prohibitively expensive; this is not likely to be the case in Montana.

Personnel Training or Acquisition

Port of entry staff would need to be trained to operate the weigh facility with weigh-in-motion technology in place. This technology might require a variety of different operating procedures, depending on the level of traffic (i.e., the port might operate differently under high volume conditions than under low volume conditions) or the enforcement actions desired (e.g., when an increase in random safety checks was desired).

Staff members at weigh stations might be reluctant to change the current operational procedures if they felt the facility was operating effectively. However, the majority of staff members would most likely favor the change to weigh-in-motion because of the increased weighing capabilities, the expected positive response from the trucking industry, and the increased time available for vehicle inspections. Staff resistance is not expected to be a problem.

Equipment Acquisition or Enhancement

The equipment required to implement a weigh-in-motion system is listed earlier in this section. Additional expenses would include land to allow for bypass lanes at the weigh facilities and construction costs associated with the bypass lanes. Physical or geographic constraints might also limit the implementation of a conventional weigh-in-motion systems. Bypass lanes, which would be required to make the WIM sorting system operate efficiently, often require more land than is available. In Montana, these items do not appear to be major barriers to system implementation at most weigh stations.

Technology Development

Weigh-in-motion technology is fully developed and should not be a significant barrier to system implementation. However, unique links would be required in some states to tie the automated weight information from WIM to the existing automation at the weigh facility.

Legislation, Rule or Agreement

Current operation allows regulatory and enforcement officials to check a truck's credentials or inspect the vehicle, driver, or load if illegal operation is suspected. Changes in legislation or rule might be required to allow enforcement or regulatory personnel to *randomly* check for driver and safety violations. In Montana, indications are that no changes are necessary to allow such random selection of commercial vehicles.

Contradictory perspectives among the regulatory/enforcement agencies and the trucking industry might, in some cases, slow the implementation process. There is an intrinsic conflict between those agency personnel charged with trying to speed up the processing of trucks at POEs, and the safety/enforcement agency personnel charged with inspecting drivers and vehicles.

MAINLINE SORTING SYSTEMS

Mainline sorting could be implemented at locations where space or other constraints limited the implementation of the conventional weigh-in-motion systems described above. The potential requirements and barriers to implementation of a mainline WIM system would be identical to those of the conventional WIM system with one exception. A mainline WIM would not require additional land and hence, would not be affected by many of the physical and geographic constraints associated with conventional sorter scale operations. Mainline sorting is also particularly advantageous in congested areas where queues of commercial vehicles at POEs can actually extend out to the main highway, thereby disrupting the traffic flow.

With mainline WIM systems, trucks that are of legal weight are not required to come into the weigh station unless directed into the facility as a result of a random safety check, or because of a credentials violation. Safety officials are concerned about losing the ability to observe the driver, load, or vehicle if trucks are not required to pass through the weigh station. Adequate time savings might be realized by the trucking industry with conventional WIM (trucks would be required to pass through the port of entry but could

be weighed at 5 to 10 mph) to justify abandoning mainline WIM because of these safety concerns.

Montana would need to make decisions that balanced the added cost of conventional WIM sorter operations with the loss of visual safety checks possible with slower speed, conventional sorter scales.

TEMPORARY CREDENTIALS ENHANCEMENT

Temporary credentials, such as short duration permits, could be added to the central repository of annual credential information. With such an enhancement, weigh station staff would have access, electronically, to the status of all credentials required for commercial vehicle operation.

Inclusion of the short-term credentials in the clearinghouse would require a much faster processing and data transfer capability. While the status of the long term credentials could be updated daily, the status of the short-term credentials would need to be available in near real-time.

This immediate availability would require the development of real-time data exchange models. *Significant technological and cost barriers might exist to the implementation of a system that required high speed, high reliability communications with a large number of remote field locations, and high speed transaction processing and database updates to and from those locations.*

Montana currently has plans to network their weigh stations, but this system will not be available at all sites for several years. Without this communications infrastructure, the verification of temporary permits is not practical.

ADDITION OF OTHER STATE AGENCY FUNCTIONS

Additional data maintained by individual states could also be incorporated in the credentials verification system. Special tax information or information pertaining to intrastate operation could be entered and shared with other states to improve regulation.

Montana should consider incorporating information about its intrastate carriers into the system.

Agency Responsibility or Procedure

The addition of state-specific information to the credentials verification system would add flexibility to the system, and would allow each state to customize the available data to suit specific needs. The national "core" data could be merged with state-specific data, thereby allowing database queries of the entire system. Additional effort would be required to ensure that the state-specific databases are updated. Benefits could be obtained by hooking the electronic credentials information to either of these databases (independently or in combination).

Budget Management

If a clearinghouse system had already been established, the addition of state-specific information would result in negligible equipment costs, as existing equipment could be used. However, depending on the additions required by the verification database (e.g., new data fields, new data transfer procedures, etc.), the cost of software development might be substantial. These additions would have to take place on both the central state credentials system and the state database being added to the verification system.

For some of the less automated states, the cost of computer equipment might prohibit or delay the implementation of this system. Montana should be able to utilize existing equipment or equipment that was planned to be purchased, to begin the process. However, it is expected that significant enhancements to the existing computer and communications systems will be required (especially at remote sites).

Personnel Training or Acquisition

If staff were familiar with the operation of the clearinghouse, little training would be needed for the addition of the state specific system. Because Montana has a moderate level of automation for CVO functions, little staff resistance is anticipated.

Equipment Acquisition or Enhancement

Additional computers, software, and links to other systems are likely to be required as part of this system. Montana is planning computer purchases and system upgrades in the near future that could be utilized for such purposes. Hence equipment acquisition is not likely to be a significant barrier for Montana.

Technology Development

The implementation of additional, state-specific information to the repository might require the development of new electronic links between systems. Montana should be able to develop these links in-house without relying on an outside source; hence, electronic links should not be a barrier to Montana's implementation of the system.

Legislation, Rule or Agreement

If similar state specific additions were developed in neighboring states, formal agreements might be required between the state's to allow access to some of the collected information. *Additionally, a change in legislation might be required to alter security levels for some of the information.*

ADDITION OF SAFETY-RELATED INFORMATION

One area that is not addressed by the credentials verification system described above is safety. Safety relates to the condition of the driver, the condition of the vehicle, and the stability of the load. Technological advances would be required in each of these areas to aid in the automated detection of safety-related problems. *The lack of existing, affordable technologies to perform these safety oriented tasks would pose a substantial barrier to their implementation. Trucking firms would also be reluctant to adopt these systems if the systems appeared to place those firms at a disadvantage with their competitors, or if the devices appeared to increase the risk that their vehicles would be stopped for inspections or citations.*

Agency Responsibility or Procedure

Although a number of safety-related databases currently exist, they are primarily used for statistical purposes. Information is frequently extracted from these databases for special cases such as safety/compliance reviews. With the proposed automated safety system(s), databases containing safety information might be accessed much more frequently; the databases would therefore need to be updated more frequently. The staffing or other resources needed to make these updates would depend on the systems to be installed and their interaction with existing information systems.

The availability of electronic components that would allow remote detection of unsafe conditions, whether it be based on driver condition (lack of CDL, over hours, drug or alcohol level, etc.) or vehicle condition (poor brakes, abnormal engine performance) would result in significant changes to the manner in which Montana enforcement agencies perform some of their tasks. The Montana Highway Patrol and the Montana Department of Transportation Motor Carrier Services Division are currently responsible for the Motor Carrier Safety Assistance Program (MCSAP). *These agencies might have serious reservations about the use of electronics to detect safety problems and might resist changing to new procedures. Any proposed system would need to demonstrate reliable safety screening and significant benefits in order to be accepted by most enforcement agencies.*

Budget Management

Funds would be required not only for the purchase of additional vehicle and roadside electronics, but also for the basic development of the systems to be installed on vehicles and the development of the communication procedures needed to rapidly transfer large quantities of data from the vehicle to the roadside. Research funds would be needed for the development of on-board safety devices and systems that would accomplish these tasks.

The high cost of developing these devices, the devices themselves, and their connection to existing systems could easily become barriers to this system implementation.

Personnel Training or Acquisition

Depending on the use that was made of the data collected from the new vehicle/roadside systems, personnel might have to be trained to update and retrieve information provided by in-vehicle or on-vehicle devices. Also, the trucking industry would need to be made aware of the use of these devices and their purposes.

However, there might be some resistance to utilizing this system, especially in the less automated states. This resistance should ease as staff became more familiar with the technology.

Members of the Montana Highway Patrol might be most reluctant to implement the system. Several enforcement officers interviewed in various states were of the opinion that a highway trooper with multiple years of experience in commercial vehicle enforcement could not be replaced with electronic devices. These officers voiced concerns regarding the need to visually observe the condition of the driver, vehicle, and load.

Data Collection or Transfer Procedures

Additional information might need to be collected and added to the database in an effort to improve safety levels. This information should be tied, via a common identification number, to other database information. In addition, driver specific information and trailer specific information would need to be tied to existing database(s).

Different levels of automation might slow the implementation of this system. Some states would be ready to implement this system as soon as the technology developed while other states would still need to develop other components of their overall system. These differing levels of automation among the states would become barriers

unless the federal IVHS architecture allowed for uneven implementation of these technologies across the country.

Equipment Acquisition or Enhancement

In-vehicle or on-vehicle equipment would need to be acquired by the trucking industry, and additional roadside equipment would have to be purchased by the state regulatory agencies. This equipment would have to be capable of providing electronic links between the in-vehicle/on-vehicle devices and the roadside and in some instances, between from the roadside and a central data repository. *The cost of equipment acquisition for both states and trucking firms might easily become a barrier to the implementation of these systems.*

Technology Development

As already stated, tamper proof electronic systems for in-vehicle or on-vehicle installation would need to be developed. Some components, such as the automated log book, have already been developed, while other, such as vehicle safety monitoring devices, have not. These devices would have to be linked to the central repository so that the information provided by the new devices could be used for verification purposes.

Different levels of automation among the states and private trucking firms would provide an additional challenge when the devices were designed, developed and implemented. *The time required to develop, test, and adopt these systems might become a barrier to system implementation as well.*

Legislation, Rule or Agreement

For the improved safety system to be implemented fully, the cooperation of vehicle manufacturers would be needed. This cooperation would help to ensure that the safety monitoring devices were widely accepted within the trucking industry. *Contradictory perspectives among the regulatory and enforcement agencies, the vehicle manufacturers, and the trucking industry might slow the development of working*

agreements in this area and, ultimately, the implementation of the improved safety system.

Because additional information regarding safety standing and driver status would be accessible with this system, formal agreements regarding information security might be required. *Regulatory limitations protecting the privacy of this information might pose a roadblock to agreement on safety device implementation.*

CHAPTER 6
RECOMMENDED AND DESIRED ACTIONS

This chapter presents a summary of the actions required to implement the transparent borders technologies described in Chapter 4, given the barriers discussed in Chapter 5. A summary of the actions that are recommended for Montana are presented at the end of this chapter. If a description of the proposed transparent border systems is required, the reader is referred to Chapter 4.

The project team recommends that Montana establish two multi-agency committees to direct state activities and participate in regional and national planning. The first of these is an Advisory Committee that would function to set policy and decide upon multi-state and legislative issues, and should be made up of MDT, MDJ, MPSC, MDHES, local FHWA, and Montana Trucking Association representatives. A Technical Committee, the second forum, would determine technology, system and procedure related issues and would likely have representation from the same agencies.

One of the first activities of the Advisory Committee would be to pursue the multi-state agreements described above. To coordinate the direction of this project nationally or regionally, it is anticipated that national or regional working groups will be formed. Montana must determine how it will be represented on these forums. It is likely that a member of members of Montana's two committees might participate in these working groups. A non-committee member might also be selected who would have a reporting relationship to the Montana committees and the working groups, and would facilitate communications between these bodies.

AUTOMATED, ONE-STOP PERMIT SHOPPING

Select Course Of Action

The initial step a state (or group of state agencies) must take to implement the automated, one-stop permitting process is to reach agreement that this capability should

be pursued. The agreement must include all of the agencies that should be involved in the system. In Montana, this agreement must include the MDT, MDOJ, MPSC, and the MDHES.

Once the state agencies have agreed that this step should be undertaken, agreements should be pursued with other states (initially, within the seven state consortium for this project) if the system will be extended to multiple states. The larger the pool of initial state participants, the less expensive (per state) will be the cost of developing the software. Furthermore, more benefits will be gained from the system, and additional changes to the system will be less likely as the number of participating states grows.

Arrange Funding

Once the states are certain that this function is desired, states will have to arrange funding. Likely sources of funds for this effort include (1) the federal government, (2) pooled state funds, and (3) IRP/IFTA implementation funding available through ISTEA. Joint funding should only be used for the cost of software development. In addition to software costs, each state will be responsible for providing the hardware needed to make the system operational within its current computer environment.

Hire Contractor

The project team recommends that the participating states hire a single contractor to develop the software. This will allow the same basic software core to be used by each participating state and will reduce the software cost to all states.

Complete System Design and Hardware Requirements

Once the contractor is on-board, the final system design should be completed. This will include determining the data to be requested by the program, the checks to be made by the program, the forms to be printed, and other items. Each state should contribute both MIS and operations staff from each agency involved in the project to the review team that helps the contractor complete the system design. Hardware needed by

each state should also be ordered at this time. Where a state already has a permit issuing system (as Montana has or soon will have), additional work may be necessary to determine how to integrate the multi-state system into the existing permit software.

Sign Interagency Agreements

While the contractor is working on the software system, the agencies involved in the project for each state will have to complete and sign any interagency agreements required to allow one agency to issue all state permits (except OS/OW). In Montana this would be easy because the MDT already issues the vast majority of permits, including OS/OW permits. The MDHES should be included for hazardous waste permits, and the MPSC may also need to be included in these agreements, depending on the outcome of changes in the issuance and registration of interstate operating authority mandated by ISTEA. One of these agencies should be designated as the lead agency for signing interstate agreements. In Montana, the MDT should be the lead agency.

At the same time, the states will also have to complete any agreements needed to allow revenue collection and funds transfer among states. These agreements should also designate the data that should be collected and transferred among states, including the number and type of permits sold, to whom those permits were sold, and any other necessary information.

System Development

The next step is to have the contractor program the recommended software system. The system will then have to be thoroughly tested within each state. Needed refinements will also have to be completed to make the system meet each state's specific needs.

During the design and testing phases of the software development, the review team of agency personnel will need to develop revised permit issuing procedures to allow the use of this software.

Staff Training and Software Distribution

Once software testing has been completed and the states know it will be accepted, the staff who will use the software will have to be trained.

Finally, once each state has become familiar with its software and is convinced that the software will work correctly, the software program for each state should be distributed to the other participating states. Additional training should also be completed at this time so that each state will be capable of operating the other state's software.

ELECTRONIC CREDENTIAL VERIFICATION

Select Course Of Action

The creation of an electronic credential verification system will require an agreement among all involved agencies affirming their support of, and participation in, the verification system. This agreement will have to include all agencies within at least one state; however, benefits from the system will only become significant if the system is widely accepted and used among several states.

As noted in Chapter 4, three separate efforts will have to be accomplished before the basic credentials verification system can begin operation. These three efforts will include the creation of a regional/national repository for transferring data among states, the substitution of electronic vehicle tags for annually replaced credentials, and the creation of an electronic based credentials verification system.

The steps that will have to be pursued to develop these systems in Montana are given below.

Creation of a Central Data Repository

Creation of a Working Group

The states that elect to implement the electronic verification system will have to initially form working groups whose function will be to guide the creation of a center to maintain the data being transferred among the states. The project team recommends that the states initially pursue this project as a national effort, as the greatest benefits can be

gained from this effort if all states participate. If interest at the national level is insufficient, interested states from this consortium should develop this system as a regional effort with the intent of expanding the system later.

The project team further recommends that the participating states work (at least initially) within the existing structure of the IRP and/or IFTA, although the working group should also contain staff members from state agencies outside of these organizations. The IRP and the IFTA will be important starting points because these organizations already provide for the transfer of information among states, and the IRP and the IFTA functions will be the most heavily impacted by the initial electronic credential verification system.

Working groups will be needed at both the state and national (or regional) levels. The national level working group will be responsible for guiding the design and development of the data repository. The state working groups (one per state) will be responsible for identifying and resolving state issues related to implementation of the verification system. (That is, the national working group will determine how the central system will work. The state working group will direct state activities necessary to make that state's systems conform to the national requirements.) The state working group may be divided into two groups, one part consisting of higher level agency heads responsible for creating the necessary interagency agreements, and one consisting of mid-level managers responsible for the details of the system design.

One of the first decisions that these working groups will have to make is to determine which credentials will be incorporated into the initial system. The project team recommends that the working group consider the four following credentials;

- IRP vehicle registration,
- IFTA fuel tax,
- interstate operating authority, and
- proof of insurance.

Each agency in a participating state that is involved in issuing or enforcing commercial vehicle credentials included in the verification system should be represented

in the state working group, and the concerns of those agencies will have to be accurately forwarded to the national working group. Both national and state working groups should include management personnel, operations personnel, and information system staff.

Select The Basic System Architecture

One of the initial tasks of the working groups will be to determine the data that will have to be maintained within the system and the data that will have to be transferred among the participating state agencies.

The second task of the national working group, which may be performed simultaneously with the first task, will be to develop the basic system architecture under which the central database will operate. The architecture that is recommended as a result of this project's findings is a central system with strong communications links to each of the participating state agencies. The state working groups will need to determine how each state will transfer data to and from the central database, given the central database architecture.

Arrange Funding

The states will need to arrange funding for the creation of the database and for the ongoing operation of that database. Potential funding sources for the creation of the database include the following:

- federal IVHS operational test funds,
- state pooled fund studies, and
- federal IRP/IFTA implementation funds.

Some state funding may also be needed to revise existing state computer systems so that they can interact with the central system.

Finally, funding will be needed to operate the central database. This funding will be required quarterly or annually and will have to be supplied by the participating states.

Computer System Construction

Once funding has been secured, the national working group should hire an outside contractor to finalize the system design and construct the system. Design information that should be finalized will include the following:

- data to be transferred,
- method of data transfer,
- timing of the data transfer,
- database functions to be performed, and
- reporting capabilities.

The working groups (state and national) will play important roles in this effort to ensure that the data collected from each state are compatible and meet state needs.

It will be very important for the working groups to emphasize that the database remain simple and flexible at this stage in its development.

Once the central system has been designed, the state working groups will have to determine how each state's computer systems will interact with that central system. State level design considerations will include the following:

- How will state data get to and from the central database? (Will there be a single point of contact or multiple points?)
- What revisions will have to be made to the existing systems to accommodate these enhancements? (Additional data fields for vehicle IDs? New programs to download data?)
- How will the state handle the matching of specific vehicles to IFTA and Operating Authority credentials identified only by carrier?

Complete Interagency Agreements

Once the basic system design has been settled and the data to be shared have been defined, the participating states will need to complete interagency working agreements to share these data in the prescribed manner. These agreements will define each state's rights and responsibilities.

In the case of the IRP and the IFTA data, new agreements may not be necessary, although minor revisions to the existing agreements may be needed. Given the current implementation stage of the base state systems for interstate operating authority and

insurance filing, it is unclear what changes to the existing interstate operating authority regulations and/or state agreements will be needed for these systems. (For instance will states that do not participate in the operating authority program be able to (or required to) enforce violations of interstate operating for neighboring states?)

Test and Refine the Data Transfer System

The next stage of the development process will be to test and refine the data transfer system between the participating states and the central repository. Testing should include all data transfers within states, and data transfers both to and from the central database. As a result of these tests, system designers may have to refine the data transfer process to meet specific state needs.

Once the data transfer process system has been designed, the states will need to develop and formalize any procedural changes required to ensure that data are transferred to and from the central database as intended. These procedures may take place automatically, may be part of the software program that performs the transfer, or may require staff time.

System Start-Up Tasks

In order to initiate the central database system, each of the participating states will need to transfer its master files (or some portion of their master files) to the central repository. This file transfer may include either all of the IRP/IFTA registered trucks or only trucks fitted with electronic tags. (This is a design decision the national working group should answer.) Because the master files will be large in comparison to the data transfers expected after the system becomes operational, this database upload process may occur differently than uploads that will occur once the system is operating normally.

Once each of the participating states has transferred to the central database the information it will be contributing to the central repository, the central database will have to merge these files and create the master file for the region (or nation).

Finally, the states will have to provide training for their staff in the operation of the data transfer system, and the central repository will have to train its staff in the operation of the center.

Electronic Tags

Create Environment For Tag Implementation

The second function that will have to take place in order for the electronic credential verification system to work will involve the selection and distribution of the electronic tags to be placed on commercial vehicles. To make this selection, working groups will have to interact with the trucking industry to ensure that the system will meet industry needs, and that the industry will support (or at least will not be opposed to) the proposed system. This selection and distribution process may be completed by either the national or state level working groups described above, or by a separate working group selected specifically for this purpose.

A key component of the project team's recommendations is the agreement that trucking firms that place electronic tags on their vehicles will not have to annually update the paper credentials carried in their cabs. (Trucking firms will still have to pay the usual fees and submit the annual paperwork for IRP, IFTA, etc. They just will not need to replace the paper credentials.)

Achieving this agreement will require administrative agreement among the participating states, the IRP and the IFTA (and perhaps other organizations, depending on the credentials included in the electronic tag). In some cases, minor legislative changes will be needed to allow the replacement of multiple paper credentials with a single paper credential and an electronic tag.

In addition, other political agreements or actions may be needed to allay trucking industry or state agency fears. For example, an agreement may be needed to affirm that enforcement agencies will not use the electronic tags to write speeding citations on a point-to-point basis.

Determine Electronic Tag to be Used

One of the simplest and yet most difficult tasks faced by the participating states will be the selection of the electronic tag to be used with the verification system. A number of tag vendors will be able to supply appropriate hardware, but the national disagreement over AVI standards may cause some delay in selecting a tag system.

The national working group that will be designing the central database (or another working group of state personnel) should work with the trucking industry to define tag requirements (on the basis of existing standards and available designs). The tag to be supplied should be part of a complete license plate (not independent of that plate).

A marketing effort should be undertaken by the participating states to encourage as many carriers as possible to participate in this system. At this same time, the working group leading this effort should work with trucking industry representatives to determine the expected participation rate within the interstate trucking community. The more states that participate, the greater will be the benefits and the lower will be the costs for all parties.

The working group should also work with the credential enforcement staff from each of the states to determine the styles and function of reader devices needed. The states are encouraged to select readers that are simple, portable, and connect easily to PC based computers and databases.

Arrange Funding

As explained in Chapter 4, the electronic tag system will be designed to be self supporting. That is, the cost of the tags will be paid by the trucking firms that participate in the system. However, the cost of the tags will likely need to be paid up front by the participating states; therefore, some initial funding source may be required.

The working group selecting the tag system will also need to determine the cost of the tags for the trucking industry. This cost will have to reflect the cost of the tags and their distribution. The cost of replacing broken or lost tags should also be determined at

this time. Note that the cost of the tag will not be meant to generate revenue for the state; it will only provide a means of paying for implementation of the tag system, which will allow the elimination of the administrative overhead associated with replacing credentials in vehicle cabs.

Purchase Tags and Readers

Using the expected market penetration as an estimate of the number of tags needed and the known requirements for reader functionality and license plate/tag design, the participating states should advertise for vehicle tags and readers. After considering the vendor responses, the working group should select the tag and reader system to be used and purchase devices as needed.

Tag Distribution System

While the tags are being purchased, the participating states will have to design and implement a tag distribution system. Staff will have to be trained to operate the system, and information will have to be provided to the trucking industry. This information will ensure that tags are correctly mounted on vehicles and cared for by participating carriers and their drivers.

Once the purchased tags have become available, the tags will have to be distributed to participating carriers.

Verification Systems Creation

The final effort required to implement the electronic credential verification system will be the creation of the verification system itself. Many of the steps needed to implement this system have been covered in the previous sections of this chapter. These steps include

- obtaining legislative/administrative permission to substitute electronic tags for paper credentials and a single (permanent) piece of paper, and
- creation of a central database system and data transfer facilities.

System Design

The next step in the creation of the electronic credential verification system will be to determine the type of computer the system should run on in each state, and the functions each state will want to have available to its field staff. Chapter 4 recommends a simple, PC-based version of the verification system that would only perform interstate credentials checks for the basic four annual credentials. In Montana, the project team recommends that the verification system be designed to run on the computer system being installed at automated ports-of-entry and on laptop computers. While this design specification may result in the development of dual systems, it will allow Montana both to use the computers already purchased for its ports and to give roving field personnel easy access to the electronic verification system database.

The project team recommends that a multi-state, pooled fund effort be followed to develop the basic verification system software. Once the system design has been finalized (including any state specific enhancements), it is important for the participating states to determine an accurate cost estimate for system development and implementation. This estimate can then be used to guide the Advisory Committee as it determines what funds are available to construct and implement the system. Montana will then be solely responsible for altering this software as needed to fit its POE hardware.

Arrange Funding

State specific funding will be required to fund the verification system design and to purchase any necessary computer hardware. This funding may come from a combination of state and federal sources. Funds from the purchase of vehicle tags may also be used to offset the cost of the verification system.

System Implementation

Once the system design and funding issues have been settled, the participating states will be able to purchase the necessary hardware to make the system operational. The states will then need to obtain a copy of the master file from the central database (see

above). This file will provide the states with the initial list of trucks participating in the electronic verification system. All future truck records will be obtained through the normal data transfer process.

The agency responsible for operating the verification system should then complete testing of the data update procedures developed above and define the procedures its staff should use to operate and maintain the system. These procedures should then be thoroughly tested and refined. Once the procedures have been accepted by the operating agency, staff responsible for operating the system should be trained to perform those new functions.

Upon completion of training, the system should be operational.

CONVENTIONAL WEIGH STATION SORTING SYSTEMS

Select Course Of Action

Montana will have to decide whether conventional WIM (i.e., sorter scales) are desired at existing or planned weigh station sites. If a site is selected to receive conventional WIM sorter scales, the following steps will have to take place:

- Determine whether the available land at the WIM site can accommodate sorter facilities (i.e., bypass lanes, sorter scales, signs, etc.). If not, can the land be purchased and at what cost?
- Determine the cost of WIM scales, signs, communications, and other improvements (in addition to land acquisition above).
- Determine whether WIM sorter scales are still desired at this site.
- Develop RFP specifications for sorter scale construction/installation. This includes providing the appropriate communications to the credentials verification system.

Arrange Funding

If, after following these steps, sorter scale operations are still desired at specific sites, as appears to be the case in Montana, the state will have to arrange to fund the weigh station improvements and construction. Funds for weigh station construction are usually provided by the MDT through the normal capital planning process. It is unlikely

that special federal funds will be available for these efforts through the FHWA, although conventional state and federal funding should be available. (Historically, most weigh stations have been built with a combination of federal aid and state funds. The current ISTEA legislation allows the use of NHS and STP funds for weigh station construction. For interstate highways, interstate construction funds can be used for new construction, and interstate maintenance funds can be used to repair, remodel and upgrade existing interstate weigh station facilities.)

Implement System

Once funds have been allocated for the new system's installation, the state will have to develop bid documents and advertise for a contractor. Given the responses to those bids, the winning contractor(s) will then be responsible for the necessary construction and system installation.

If no previous sorter scale operations exist within the state, operational procedures will need to be developed for the staff who will operate that location. These procedures will have to include the steps to follow if the electronic verification system fails or if a tagged truck is not in the database.

As part of the system implementation effort, it will be important to market the availability of the WIM sorter scale to the trucking industry. This marketing effort will increase the number of trucking firms participating in the system and increase the benefits to all those involved.

Finally, weigh station staff will have to be trained in the operation of the sorter scale and the credentials verification system.

MAINLINE SORTING SYSTEM

Select Course Of Action

Montana will have to decide whether mainline WIM is desired at existing or planned weigh station sites. At this time, it is likely that Montana personnel will consider

mainline WIM is a secondary option to conventional WIM. If mainline WIM is later desired, several steps will have to be taken to implement these types of scales.

Statute Revisions

In some states, minor revisions may need to be made to existing statutes or administrative rules to allow "cleared" trucks to bypass open weigh stations or to allow enforcement officers to randomly select vehicles for safety inspections (without "probable cause"). This is not likely to be an issue in Montana.

System Design

For each site at which mainline WIM will be installed, the following design steps will have to take place:

- Determine whether the existing roadway can accommodate a WIM scale (i.e., whether the scale will work accurately; if not, roadway reconstruction may be needed).
- Determine the communications technology to be used to inform truck drivers that they should bypass or enter the scale house (overhead signs or in-vehicle signing).
- Design the physical layout of the system.
- Determine the cost of WIM scales, signs, communications, and other improvements (e.g., new pavement), as designed above.
- Determine whether the cost of WIM scales, signs, communications, and other improvements is acceptable.

Arrange Funding

If mainline scale operations are desired in Montana, the state will have to arrange to fund the necessary equipment and site construction. Funds for weigh station construction are usually provided by the MDT through the normal capital planning process. It is unlikely that special funds will be available for these efforts through the FHWA, although conventional state and federal funding sources should be available. (ISTEA allows the use of federal NHS and STP funds for weigh station construction and equipment purchase. In addition, for interstate highways, interstate construction funds can also be used for weigh station construction and equipment purchase.)

Implement System

The first step in installing mainline WIM is to develop specifications for scale construction, installation, and acceptance testing. Once these specifications have been developed and funding has been secured, the state will have to develop bid documents and advertise for a contractor. On the basis of the responses to those bids, the winning contractor(s) will then be responsible for the necessary construction and system installation. System installation will include providing the new system with the appropriate communications to and interaction with the existing credentials verification system.

Because mainline bypass scales are not currently operating in Montana, operational procedures will need to be developed for the staff who will use the weigh stations at mainline WIM sites. These procedures will have to include the steps to follow if the electronic verification system fails, a tagged truck is not in the database, or a truck illegally bypasses an open weigh scale (i.e., the driver disregards the message to enter the weigh station).

As part of the system implementation effort, it will be important to market the availability of the WIM sorter scale to the trucking industry. Marketing will increase the number of trucking firms participating in the system and increase the benefits to all those involved. A public education campaign about the new system's capabilities should also be pursued to inform truckers about the system, particularly if in-vehicle signing will be used to communicate with drivers.

Finally, weigh station staff will have to be trained in the operation of the mainline scale and credentials verification system.

TEMPORARY CREDENTIALS ENHANCEMENT

Select Course Of Action

As with the previous transparent borders functions, a consensus will have to be reached among the participating states and/or agencies to add temporary credentials to the

basic credentials verification system. Montana will be able to add only its own trip permits to the verification system, unless other states provide a similar service. If temporary credentials are added to the verification system, Montana's communications systems will need to be upgraded to meet the needs of the short duration permit requirements. (See Chapter 4)

If multiple states will provide these electronic trip permits, revisions to the previous cooperative agreements will be needed to ensure that all participating states can meet the update processing time requirements associated with trip permits.

Part of the consensus process will be to determine the trip credentials that will be added to the electronic credentials system and the data requirements implied by those credentials. In addition, the participating states will need to determine the processing time required for acceptable operation of the system. (See Chapter 4)

System Design and Revision

Once the participating states have developed the primary requirements of the system enhancements (data to be carried and system response time), the actual changes to the existing credentials verification system may be determined. The potential changes will include

- new computer hardware at the state and central repository levels,
- additional computer software (or software revisions) at the state and central repository levels,
- new communications systems (the speed and frequency of the required communications increase),
- more staff who need to access the credentials system (either to upload or download from the central repository), and
- procedural changes to the existing Montana permits and enforcement systems.

An outside contractor will likely be needed to design these revisions, although the revisions could be performed by the contractor operating the central repository.

Arrange Funding

System upgrade funding will be necessary. The cost of upgrading the system (if performed for transfer of information among states) will be high; therefore, substantial funding will be needed. The source(s) of these funds is not clear at this time. A large portion will likely come from state agency sources. Currently, it appears unlikely that the USDOT will fund this type of enhancement out of discretionary sources.

System Start-Up Tasks

One of the early tasks in adding temporary credentials to the basic electronic system will be to market the new permit capabilities to the trucking industry. Trucking firms already participating in the electronic credentials verification system will be obvious customers of the permit service. However, the new permit service may also convince additional trucking firms to participate in the electronic credentials system. Marketing the new permit capabilities will increase the market penetration of the new permitting system and decrease the number of permits and credentials handled with paper. This heightened participation will increase the utilization of the system which will, in turn, reduce the cost of handling permits in the old manner and decrease the cost of the new system per permit issued.

Once the system is ready for operation, it should be thoroughly tested. Then any required refinements should be made, and the system should be tested again.

At this time, any procedural changes required for system implementation should be finalized (e.g., what will happen when a vehicle arrives at a weigh station before its permit purchase has been entered into the database?). Lastly, staff training should be provided for both staff who will operate the system and personnel who may inadvertently interact with the permits issued by the new system.

THE ADDITION OF OTHER MOTOR CARRIER OR STATE AGENCY FUNCTIONS

Select Course Of Action

As discussed in Chapter 4, the credentials verification system will be designed so that states will be able to modify the basic system to meet their needs. The state regulatory and enforcement agencies should continue to work together after the initial system implementation to determine which enhancements should be added to the system. The state working groups developed earlier should serve as the catalyst for these discussions.

The working group should determine the state-specific credentials that will be added to the state credentials enforcement system, the data requirements for those credentials, and the basic system architecture needed to provide the credentials verification database with that information.

Revise Interagency Agreements

On the basis of the discussions of the state working group, existing interagency working agreements should be revised to allow for agreed upon additions to the state electronic credentials verification system. These revisions may include the transfer of additional data items, the transfer or sharing of responsibilities, or simply the transfer of funds from one agency to another.

Design System Revisions

The state working group will most likely need to hire outside consulting expertise to complete the system revisions for the planned upgrades, although these revisions may be performed in-house. The tasks that will need to be completed include the following:

- Finalize the data items that will be required to add the planned functions (the data structure revisions should be designed to be as simple and transparent as possible).
- New field operations procedures will have to be developed to use the new data available through the credentials verification system.
- Ways to transfer data from multiple state and regional databases and to merge those new data with the existing records will have to be designed.

- The hardware and software changes required to operate the revised system will have to be determined.
- The cost of the system will have to be more closely defined.

Once sufficient information has been developed, the state will have to create the specifications needed to advertise for contractor assistance, if desired, or for internal IS staff use. The state will then have to advertise for and select the contractor. The contractor will be responsible for completing the system design and programming the system, while the participating state agencies will be responsible for project oversight, management review, and technical feedback to the contractor.

Arrange Funding

The state will have to determine the source(s) for funds to provide for the planned database changes. Funding will have to be provided not only for the system construction and revision expenses, but for the ongoing operational costs of the new system. The project team expects that the vast majority of funds needed for these revisions will be drawn from existing state sources. The FHWA is not expected to provide discretionary funding for these efforts.

System Start-Up Tasks

One of the early tasks in the addition of state specific enhancements to the credentials verification system will be to educate the trucking industry about the new capabilities of the system. Trucking firms already participating in the electronic credentials verification system will be obvious users of the new state specific system capabilities. However, the new service may also convince additional trucking firms to participate in the electronic credentials system. Marketing the new capabilities will increase the market penetration of the new system enhancements, thereby reducing the cost per unit of the new system.

Once the system is ready for operation, it should be thoroughly tested. Then any refinements required should be made, and the system should be tested again.

At this time, any procedural changes required for system implementation should be finalized (e.g., what will happen when the system fails?). Lastly, staff training should be provided for both staff who will operate the system and personnel who may interact with the permits issued by the new system. For example, local police forces will need to be informed of both the new system and any changes in the credentials being carried by trucks.

ADDITION OF NEW SAFETY, CDL, OR ELECTRONIC LOG BOOK VERIFICATION

Select Course Of Action

The selection of new components and capabilities at the national level should be done by groups of states working at the national level with the trucking industry and federal officials. Components and capabilities may include:

- vehicle safety information ("This truck's brakes are/are not working properly."),
- CDL information ("This truck is being driven by John Smith. He has been at the wheel for 4 hours and passed a breathalyzer test when he started the engine."), or
- log book information ("The odometer reading for this vehicle was 102340 when it passed the Oregon state line at 3:45 PM.")

Working groups will need to determine the functions that will benefit both the states and the trucking industry, the functions that may be cost effectively implemented, and the revisions that will have to be added to the existing credential verification system to make these functions possible.

On the basis of these discussions, each working group will need to determine its selected course of action, the goals it will wish to obtain, and the steps that will be needed to reach those goals.

Set Standards

The vast majority of the enhancements previously discussed will require that substantial amounts of variable information be transmitted between trucks and the

roadside. Furthermore, several of these systems may be selected for implementation, and different trucking firms and states may implement different sets of these capabilities.

To provide flexible implementation, the project team recommends that the national working group develop and adopt a basic transmission standard between the vehicle and the roadside. On-board systems may then be developed in a modular fashion using this transmission standard. Each modular component, making use of the transmission standard, will be triggered by a defined communications protocol.

System Development

Research will then be needed to develop the systems to be installed on the vehicles and on the roadside. This research should be directed by national groups (FHWA, NCHRP, IVHS America, etc.), and should lead to testing of the new systems. The market potential for these functions should also be further explored.

Design System Revisions

Once enhancements have been selected for implementation and the basic design of those enhancements has been determined, the impacts of those enhancements on the existing credentials verification system will have to be determined. These revisions may include new hardware and software, communications system modifications, and changes to the procedures followed by both state agency personnel and truck drivers and carriers.

Arrange Funding

On the basis of the design of the system enhancements and the required changes to the credential verification system, the cost of the system enhancements will have to be determined. Funding for these enhancements will then have to be secured. Funding sources will depend on the system components selected; however, convincing the agency/group providing the funding that the benefits it will receive will outweigh the costs expended will pose the real challenge to these funding efforts.

System Implementation

Once funding for the system has been secured, the working group will be able to select contractors to finalize the system design, construct the system (including both the enhancements and the revisions to the existing system), purchase the necessary equipment, install and test the equipment and software, and make any necessary revisions to the system.

Table 2. Transparent Border System Recommendations and Montana's Responsibilities

Required Actions	Responsible Agency(s)
Automated One Stop Permit Shopping	
Decision to participate	MDT, MPSC, MDHES
Designate MDT as office of primary authority	MDT
Pursue multi-state agreements	Advisory committee
Arrange multi-state funding	Advisory committee
Contract requirements, system definition, contractor selection	Technical committee
Procure hardware, software, and telecommunications capabilities	MDT, MPSC
Interstate agreements for permit issuance and funds transfer	Advisory committee
System development and testing	MDT
Personnel training	MDT, MPSC, MDHES
Distribution of software	MDT
Regional/National Data Repository	
Determine representation to national and/or regional working groups	MDT, MDJ, MPSC, MDHES
Determine Montana's credentials to be included in the database	State advisory and technical committees
Determine system architecture	Regional/national working groups
Determine Montana data transfer system	Technical committee
Determine funding	Advisory committee
Develop regional/national repository	Contractor
Develop state database refinements needed	MDT, MDJ, MPSC, MDHES
Central data file creation and central repository staff training	National working group
Staff training	MDT
Electronic Tags	
Coordinate legislative/administrative rule changes	MDT, MDJ, MPSC, MDHES
Coordinate agreements with IRP/IFTA	Advisory committee
Define and select electronic tag	National/regional working groups
Solicit carrier participation	Advisory group
Determine reader devices	Technical committee
Determine initial tag purchase funding	Advisory committee
Solicit for and purchase electronic tags	MDT
Distribute tags and credentials	MDT

MDT Montana Department of Transportation
MDJ Montana Department of Justice
MPSC Montana Public Service Commission
MDHES Montana Department of Health and Environmental Service

Table 2. Transparent Border System Recommendations and Montana's Responsibilities (continued)

Required Actions	Responsible Agency(s)
Verification System	
Determine computer type	MDT/MDJ
Determine funding	MDT/MDJ
Download master data base file	MDT/MDJ
Transfer to remote sites	MDT/MDJ
Develop operating procedures and train staff	MDT/MDJ
Conventional Weigh Station Sorting Systems	
Determine need for WIM at POEs and other weigh stations	MDT
Determine funding	MDT
Select installation contractor and manage construction	MDT
Market system features to trucking industry	MDT
Additional staff training as necessary	MDT
Plan additional weigh station WIM systems as needed	MDT
Mainline Sorting System	
Determine need for mainline screening at weigh stations	MDT
Select and prioritize sites	MDT
Arrange funding	MDT
Develop and install systems	MDT
Develop operational procedures and train staff	MDT
Market to trucking industry	MDT, MDJ, MPSC, MDHES
Temporary Credentials	
Determine which temporary credentials should be added, if any	Advisory committee
Develop in-state agreements	Advisory committee
Determine system and operational impacts	Technical committee
Determine multi-state participation	Advisory committee
Manage design of hardware, software, and telecommunication system enhancements	Technical committee
Arrange funding	Advisory committee
Market to trucking industry	Advisory committee
Manage system development	Technical committee
Develop procedures for data transfer and train staff	Technical committee

MDT Montana Department of Transportation
MDJ Montana Department of Justice
MPSC Montana Public Service Commission
MDHES Montana Department of Health and Environmental Service

Table 2. Transparent Border System Recommendations and Montana's Responsibilities (continued)

Required Actions	Responsible Agency(s)
Other Motor Carrier/State Agency Functions	
Determine other beneficial enhancements (e.g., intrastate operating authority)	Advisory committee
Revise state and/or agency agreements	Advisory committee
Determine system and operational impacts	Technical committee
Determine multi-state participation	Advisory committee
Manage design of hardware, software, and telecommunication system enhancements	Technical committee
Arrange funding	Advisory committee
Market to trucking industry	Advisory committee
Manage system development	Technical committee
Develop procedures for data transfer and train staff	Technical committee
Safety, CDL or Electronic Log Book Verification	
Determine benefits of functions for states and trucking industry	Advisory committee
Select options	Advisory committee
Market to trucking industry	Advisory committee
Develop system transmission standards and communications protocol	Regional/national working groups
Direct research efforts for vehicle and roadside components	Regional/national working groups
Determine impact to existing system (hardware, software, communications, and procedures)	Technical committee
Manage system design	Technical committee
Arrange funding	Advisory committee
Manage system development and installation	Technical committee
Develop new operating procedures and train staff	Technical committee

MDT Montana Department of Transportation
MDJ Montana Department of Justice
MPSC Montana Public Service Commission
MDHES Montana Department of Health and Environmental Service

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